Ontario

Ministry of
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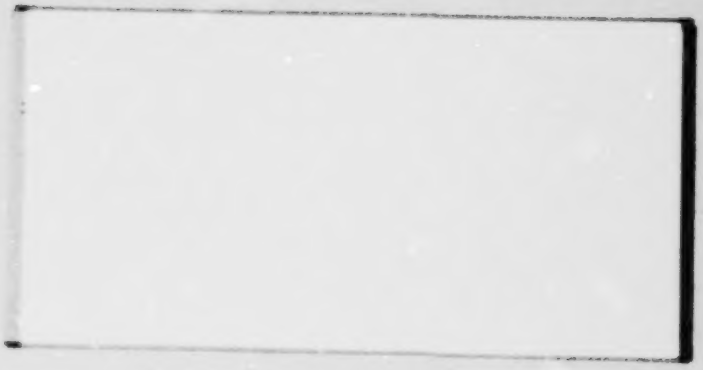

TECHNICAL SERVICES DIVISION
RESEARCH & DEVELOPMENT SECTION

VISUAL

WINDOW PERFORMANCE

Prepared for

The Ministry of Municipal Affairs and Housing

by

Research and Development Section

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EXECUTIVE SUMMARY

The intent of this study was to identify and evaluate the window performance characteristics of window installations by visual means using Ontario Housing Corporation (O.H.C.) projects across Ontario as a sample.

The window investigation was carried out to achieve the following objectives:

- To determine the causes of window deterioration in residential buildings
- To develop a visual checklist not requiring highly technical testing equipment to assess window performance
- To review window safety latching devices.

The study report is presented in the following manner:

PART I

- Discussion of the fundamental factors involved in the overall appraisal of window performance.

PART II

- Identification of buildings with window related performance problems by means of circulating a questionnaire to Ontario Housing Corporation Property Management and Ministry of Municipal Affairs and Housing Construction Managers
- Review of window replacement projects identified in O.H.C.'s 1982 and 1983 Metro Budget

- Preparation of a visual checklist by a consultant to aid the writer in documenting window performance during field inspection of existing installations

PART III

- Analysis of information results from the survey questionnaires.

- Investigation and analysis of a representative sample of different window types through site visits

- Examination of various types of automatic safety devices currently on the market.

PART IV

The report concludes with the following salient findings:

- A survey of public housing buildings indicated that dry rot caused by water accumulation was the prime reason for window deterioration at sill corners.

- Due to the problems associated with periodic remedial painting and high susceptibility to breakdown through improper maintenance, it is highly recommended that wood windows not be used in public housing projects.

- Sashless wood and semi-sashless vinyl/wood horizontal sliders had the poorest performance in the study sample, with the former exhibiting 94% dry rot and air infiltration and the latter 91% air infiltration and 64% extrusion breakage. These window types are also not recommended for installation in new construction.

- To provide protection from weathering and dry rot, wood window frame (i.e. rough bucks) should be made to shed water or covered by extruded aluminum sills with caulked edges.

- In multi-storey buildings safety latching devices should be installed in such a manner as to protect the general public from unimpeded openings especially with vinyl windows.

PART I - WINDOW BACKGROUND

1. Introduction

Residential windows in recent years have become a major concern especially due to increasing energy costs. Although these considerations are important, other factors need to be taken into account in looking at window performance. Many of these will bear directly on the ability of a window to keep cold out.

Inherently, glazing lacks the insulating properties found in other building materials, and derives its thermal values from two key sources:

1) Interior/Exterior air films

2) The presence of entrapped air spaces between two or more panes of glass.

In fact, the thermal value of sheet glass is negligible.

Thermal "R-values" are extensively quoted by manufacturers to describe the energy effectiveness of fenestration, although difficulties exist in establishing the surface air film coefficient of glass. Until a better method to measure the 'absolute' R-value is developed only a film estimate can be used. The main thrust of this report will focus on other performance factors which can be visually checked in the field.

These factors, many of which contribute to the windows thermal performance, are as follows:

- Operability of the window sash
- Durability of its components
- Structural integrity of the assembly
- Air tightness characteristics
- Water penetration
- Thermal break (Frost Penetration)

Currently a new C.S.A. A 440-M Window Standard is being prepared under the auspices of C.M.H.C. and the Canadian Door and Window Manufacturers' Associations. It is the intent that this Standard will better define the functional performance aspect of all window types, regardless of component materials.

1.1 Window Unit

A 'Window Unit' can be defined as a glazed assemblage of component parts (other than a door) installed in an exterior building opening. In looking at these units they are usually selected to fulfill several of the following functions:

- Daylighting
- Natural Ventilation
- Aesthetics
- Weather Tightness
- Exterior View

- Entry and Egress
- Solar Heat Gains

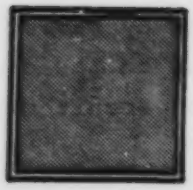
The initial selection of an optimum glazing unit design is usually made by reviewing above criteria in relation to its impact on the overall effectiveness as building component and architectural feature.

How well the window unit performs the functions outlined is subject to additional criteria which includes cost, durability, and performance in use. All these play an important role in the final selection.

1.2 Window Types

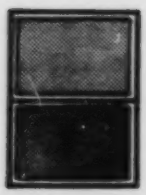
Predominant window types installed in the residential sector are illustrated in Figure 1/page 4. The majority of windows observed through on-site visits appeared to be horizontal sliders and composite horizontal sliders usually installed in two-storey walk-up Senior Citizen and Family apartment buildings. Other less common are projecting windows (i.e. casement, awning, hopper) found in Figure 2/page 5 are shown for comparative purposes only. These types of windows were not prevalent in the field sample. Projecting windows, for example, are claimed to exhibit superior resistance to air leakage in comparison to sliding types, and might be valid option to consider for energy conservation. This can be attributed to the enhanced sealing pressures generated by the latching mechanisms against the window frame.

FIGURE 1 COMMON TYPES OF WINDOWS

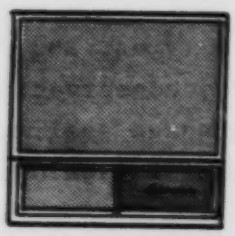


Fixed

Horizontally Sliding



Vertically Sliding

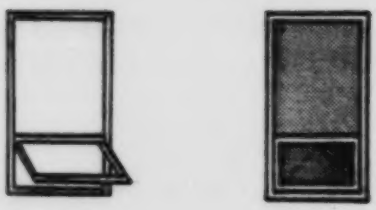


Composite

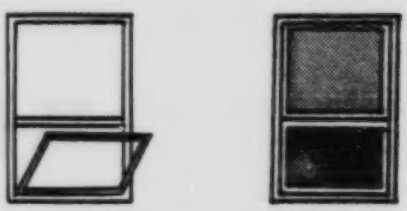
(Fixed lite over Horizontal slider)

FIGURE 2
PROJECTING WINDOWS

CASEMENT



AWNING



HOPPER

1.3 Window Components

Window sash frames are made out of a number of different materials, the most common are:

- Aluminum
- Steel
- Wood
- Vinyl
- Composites

Substantial numbers of individual window classifications can be generated by combining the above sash/frame materials with the various window types.

Further sub-classification can also be created with different weatherstripping and locking hardware variations, and it becomes quite apparent that a standard frame assembly is probably non-existent.

Therefore, to develop reliable data, it became apparent that a detailed review of window components through a checklist became necessary in order to evaluate the performance of windows.

The common window components are illustrated in Figures 3, 4 and 5 and include:

- Head - Top horizontal window frame member
- Jamb - Outside vertical window frame member

- Sill - The base of the window frame sloped to shed rainfall

- Sash - The secondary frame of wood, metal or vinyl which actually holds the operable window light assembly

- Rail - Horizontal outside sash window member

- Stile - Vertical outside sash window member

- Meeting Rail (or Stile) - Horizontal or vertical pair of sash members that engages at a common point in the closed position

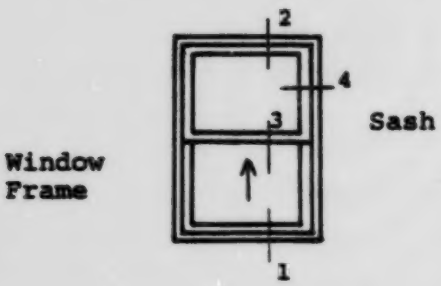
- Mullion - Perpendicular member which divides two or more fixed window lights

- Muntin - A horizontal member that divides two or more fixed window lights

- Top Rail, Bottom Rail Pull Stile - A member applied to top, bottom or sides of the operable window sash member

FIGURE 3

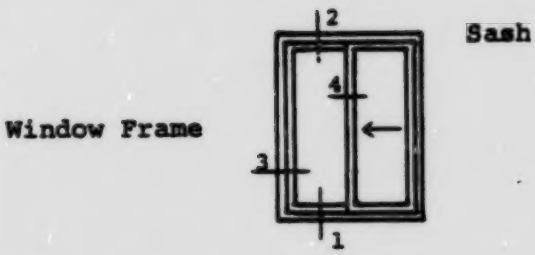
VERTICAL SLIDER



Sash Members:

1. Sill & Bottom Rail
2. Head & Top Rail
3. Meeting Rail (Horizontal)
4. Stile (Vertical)

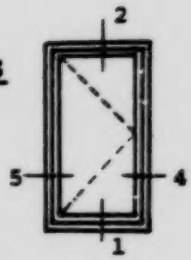
FIGURE 4
HORIZONTAL SLIDER



Sash Members:

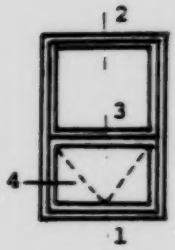
1. Sill & Bottom Rail
2. Head & Top Rail
3. Pull Stile (Vertical)
4. Meeting Stile (Vertical)

FIGURE 5
PROJECTING WINDOWS



Casement

Awning



Hopper

Sash Members:

1. Sill & Bottom Rail
2. Head & Top Rail
3. Meeting Rail (Hor.)
4. Stile (Vertical
5. Meeting Stile (Vertical)

PART II - DATA COLLECTION

Two surveys were undertaken, one through a Construction/Property Management Window Performance Questionnaire (Appendix "A"), page 54 and the other through a Review of Window Replacement Undertaken by Metropolitan Housing Authority (M.T.H.A.) in 1982-1983. The detailed survey results are contained in Appendices "B" and "C" respectively, pages 58 and 68.

In order to achieve a thorough review of buildings with window oriented problems the following Ontario regions were investigated:

- Northwestern
- Northern
- Central
- Eastern
- Southern
- Southwestern
- Metro (Toronto).

These regions were selected: (1) as window information pertaining to public sector housing was readily available in those areas and (2) to generate a representative sample from across the Province.

2.1 Construction/Property Management Survey

A questionnaire was circulated to all construction property managers to identify the major sources of window failure.

The actual survey was based on a ten (10) point formula which looked at such items as:

1) building location

2) type of tenancy

3) building type

4) building height

5) building age

6) type of window installations

7) type of window sash

8) list of performance problems

9) method of operations

10) safety catch devices.

The construction management survey results represent the newer buildings built within the last four (4) years. The property management survey results, on the other hand, are aimed at user responses for older buildings built within the last ten (10) years.

2.2 M.T.H.A. 1982-1983 Budget Survey

The M.T.H.A. 1982-1983 Budget Survey was included in the study to broaden the information data base. The results of this sampling indicated that buildings identified as having window problems were those providing family accommodations with an average age of seventeen (17) years. Large cost allowances were set

aside for window renovation and or replacement. These ranged from approximately $1,058,800/year in 1982 to $1,399,000 in 1983. See Table 3, page 19. From the magnitude of these figures window replacement is a sizeable problem in public sector housing.

Based on the initial survey results the following problems were encountered with the survey:

- Failure of respondents to complete the actual survey form providing only generalized responses

- Follow-up verification by telephone was required to clarify vague responses

- Restructuring of some of the survey questions (i.e. item #10 Safety Latches) could have perhaps gleaned further information.

2.3 Visual Checklist

A visual checklist, Appendix "D" page 72, was developed by Warnock Hensey Professional Services Ltd. to further document the causes of window deterioration.

The major overriding objectives of this window checklist was to elicit three (3) levels of information, namely:

- Descriptive data on onsite window deterioration in public housing buildings
- Visual information not requiring highly technical testing equipment to assess window performance
- A review of different window safety latching devices.

The format of the visual checklist was broken down into the following five (5) categories:

A Building Identification

Each building surveyed was identified by the following criteria:

- type of building
- type occupancy
- age of building
- number of stories

B Overall Building Window Description

This section was developed to define the overall window type in the particular building under investigation. It took into account such factors as:

- o Generic window type (i.e. wood, steel, aluminum, vinyl)
- o thermal breaks
- o sash frame type
- o window operation (i.e. slider, casement, awning, hopper)

C General Configuration of Onsite Windows

Under this category the typical onsite window configurations and their locations were described in greater detail and classified into three (3) general classifications:

- o standard window unit
- o composite window unit
- o retrofit window unit (i.e. existing steel window renovated by aluminum storm).

The content of this part were as follows:

- o location
- o dimensions
- o glazing, thickness and type
- o weatherstripping
- o hardware
- o screening
- o finish
- o identification names (i.e. C.G.S.B. numbers)

Further pages could be added to this section to accommodate a greater number of window samples.

D Visual Inspection

This section was developed to analyze three (3) window samples concurrently in units exhibiting problems with performance.

unit was assessed by reviewing some thirty-five (35) questions contained under the following sub-headings:

A. General Conditions
B. Operational Check
C. Glazing
D. Weatherstripping
E. Safety Latching Devices
F. Sealant
G. Optional Disassembly Inspection.

E On-site Window Tests

Two (2) simple on-site test methods were developed to evaluate window performance. They included:

- o use of a smoke pencil to evaluate air infiltration
- o water hose spray for a specified duration to measure water penetration.

Subsequently a short form version, Appendix "E" page 85 evolved to streamline the field review process. This condensed checklist was used to document performance data on the major types of existing O.H.C. window installations.

PART III - FINDINGS

3.1 Survey Results

In all, the survey encompassed 126 buildings (12,533 units) with 64 family unit and 62 senior citizen developments. A breakdown of project data (i.e. locality, number of buildings, number of units, housing type and type of occupancy are summarized in the following three tables. See pages 17, 18 and 19.

TABLE I

SUMMARY OF CONSTRUCTION MANAGER SURVEY RESULTS

LOCALITY	PROJECT IDENTIFICATION # of Bldgs. Families	# of Bldgs. Seniors	# of Units Families	# of Units Seniors	Average Age of Bldg.
1) Northern	-	8	-	195	2
2) Northwestern	-	2	-	71	4
3) Eastern	-	9	-	297	5
4) Southwestern	1	9	5	448	3
TOTAL	1	28	5	1011	* 4

* Average overall building age.

TABLE II

SUMMARY OF PROPERTY MANAGEMENT SURVEY RESULTS

LOCALITY	PROJECT IDENTIFICATION # of Bldgs. Families	# of Bldgs. Seniors	# of Units Families	# of Units Seniors	Average Age of Bldg.
1) Northwestern	6	4	116	133	11
2) Northern	5	5	215	290	12
3) Eastern	2	8	134	759	11
4) Southern	6	4	516	676	13
5) Southwestern	6	4	226	172	18
6) Central	1	9	98	543	11
TOTAL	26	34	1305	2573	* 13

* Average overall building age.

TABLE III

SUMMARY OF M.T.H.A. 1982-1983 BUDGET SURVEY RESULTS

LOCALITY	PROJECT IDENTIFICATION # of Bldgs. Families	Seniors	# Families	Seniors	Average Repair Budget Estimate($)	Average Age of Bldg.
1) Metro 1982	17	-	2770	-	$1,058,800 *($62,282)	17
2) Metro 1983	20	-	4785	-	$1,399,000 *($69,950)	17
TOTAL	37	-	7555		$2,457,800 *($66,427)	17

*( ) Denotes average cost per bldg.

TABLE IV

SUMMARY OF PROPERTY - CONSTRUCTION MANAGEMENT AND 1982-1983 O.H.C. (METRO) WINDOW PERFORMANCE SURVEY INFORMATION

EXISTING WINDOW TYPES	NUMBER OF WINDOW INSTALLATIONS	* WINDOW PERFORMANCE CATEGORIES																AVERAGE AGE OF WINDOW (IN YEARS)
		DRY ROT	AIR INFILTRATION	WATER PENETRATION	CONDENSATION	EXTRUSION BREAKAGE	REVEAL DETERIORATION	DIFFICULT TO OPEN	THERMAL BREAK	SECURITY LACKING	SILL TRACK BREAKAGE	CAULKING FAILURE	WEEP HOLE CAPACITY	FRAME INFORMATION	CLEANABILITY	HARDWARE BREAKAGE	WILL NOT ACCOMMODATE AIR CONDITIONER	
1) Aluminum Horiz. Sliders	42	12	40	40	24	14	19	14	10	2	5	12	2	5	7		2	10
2) Wood Horiz. Sliders (Sashless)	31	94	94	71	29		23	10			3				3	3		15
3) Wood Horiz. Sliders (Sashed)	3	100	67	33	100			33										20
4) Wood Double Hung Vertical Sliders	3	100			67			33										30
5) Vinyl/Wood Horiz. Sliders (Semi-sashless)	11	18	91	45	27	64	45							9				12
6) Vinyl/Wood Horiz. Sliders (Semi-sashless)	7	29	43	57	14	43	14							29		29		8
7) Steel Casement	3		33		67		67	67										23
8) Wood Casement	1							100										12
9) Thermo	1														100			8
10) Combinations: Aluminum Sliders and other types	3	33	33	33	33		33						33					22

* Percentage (%) Occurrence/number of window installations

The construction/property management survey and Ontario Housing Corporation 1982 - 1983 Metropolitan Toronto window replacement budget results are summarized in Table IV page 20. The salient findings of the two surveys were broken down into the major performance categories and revealed the following observations:

PERFORMANCE CATEGORY	PERCENTAGE % OCCURRENCE
o Dry Rot	
- Wood Horiz. Sliders (Sashed)	100%
- Wood Double Hung Vert. Sliders	100%
- Wood Horiz. Sliders (Sashless)	94%
- Combination Aluminum Slider and other	33%
- Vinyl/Wood Horiz. Sliders (Sashed)	29%
o Air Infiltration	
- Wood Horiz. Sliders (Sashless)	94%
- Vinyl/Wood Horiz. Sliders (Semi-Sashless	91%
- Wood Horiz. Sliders (Sashed)	67%
- Vinyl/Wood Horiz. Sliders (Sashed)	43%
- Aluminum Horiz. Sliders	40%
o Water Penetration	
- Wood Horiz. Sliders (Sashless)	71%
- Vinyl/Wood Horiz. Sliders (Sashed)	57%
- Vinyl/Wood Horiz. Sliders (Semi-Sashless)	45%
- Aluminum Horiz. Sliders	40%
- Combined aluminum and other window types	33%

PERFORMANCE CATEGORY	PERCENTAGE % OCCURRENCE
o Condensation	
- Wood Horiz. Sliders (Sashed)	100%
- Wood Double Hung Vertical Sliders	67%
- Steel Casements	67%
- Combined aluminum and other window types	33%
- Vinyl/Wood Horiz. Sliders (Semi-Sashless)	27%
o Extrusion Breakage	
- Vinyl/Wood Horiz. Sliders (Semi-Sashless)	64%
- Vinyl/Wood Horiz. Sliders (Sashed)	43%
- Aluminum Horiz. Sliders	14%
o Reveal Deterioration	
- Steel Casements	67%
- Vinyl/Wood (Semi-Sashless)	45%
- Wood Horiz. Sliders (Sashless)	23%
- Aluminum Horiz. Sliders	19%
o Operability	
- Wood Casement	100%
- Steel Casement	67%
- Wood Double Hung Vertical Sliders	33%
- Wood Horiz. Sliders (Sashed)	33%
o Thermal Break	
- Aluminum Horiz. Sliders	10%
o Frame Deformation	
- Vinyl/Wood Horiz. Sliders (Sashed)	29%
- Vinyl/Wood Horiz. Sliders (Semi-Sashed)	9%

In analyzing the data in Table IV, a larger sampling in some specific window categories (i.e. Steel Casements, Wood Casements and Sealed Thermo Pane Units) would have generated more reliable information.

3.2 Checklist Results

Using the condensed short form checklist the major four types of O.H.C. window installations were field tested to confirm survey results and validate the actual format structure. The results are as follows:

3.2.1 Aluminum Horizontal Sliders

- Dry rot at wooden window sill frame corners was one of the primary reasons for ultimate failure and replacement of this type of unit (See Figure 6)

- The wooden window sills generally lacked sufficient slope, causing water accumulation, paint to peel and subsequent decay to set in (See Figure 7)

- Complaints of air infiltration were quite prevalent and seemed to be caused by a breakdown of weatherstripping and gaps in the frame (i.e. cable penetrations and window frame cracks) (See Figures 8, 10 and 11)

- Breakdown of anodized aluminum finish was also observed on some of the projects (See Figure 9)

- Lack of sill track cleaning made some window units with glides difficult to open

- Water penetration occurred mainly at two areas
  1) Window sill corners
  2) Overflowing of the sill track.

FIGURE 6

FIGURE 7

FIGURE 8

FIGURE 9

FIGURE 10

FIGURE 11

3.2.2 Wood Horizontal Sliders (Sashless)

- Dry rot at sill frame corners was extensively identified and appeared to be caused by water accumulation and inadequate window sill slope (See Figure 12)

- High levels of air infiltration were also identified at glass to glass central meeting juncture (See Figure 13)

- Plastic handle hardware and metal safety latch devices tended to be missing and/or broken off (See Figure 13a)

- Stiff operating action of the movable window caused by dirt build-up was especially a problem in Senior Citizen apartment units (See Figure 13b)

- Aluminum handles found on some units tended to pull off due to the actual weight of the operable light and the restraining friction generated by debris in the sill track (See Figure 13c)

- Locking hardware provided little security and tended to be inoperable (See Figure 13d)

- Damage to plaster or drywall reveals was mainly at interior corners below the window unit

- Water penetration was commonly at the corners

FIGURE 12

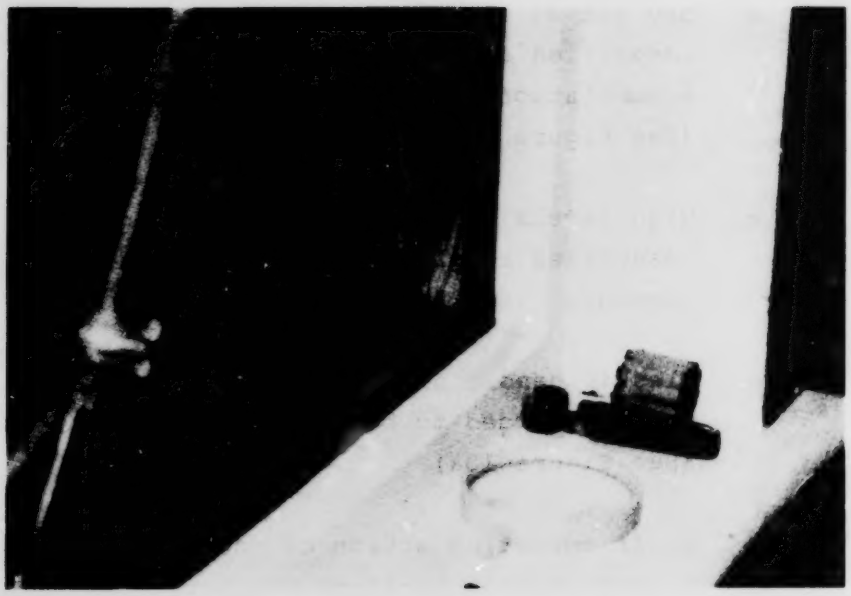


FIGURE 13

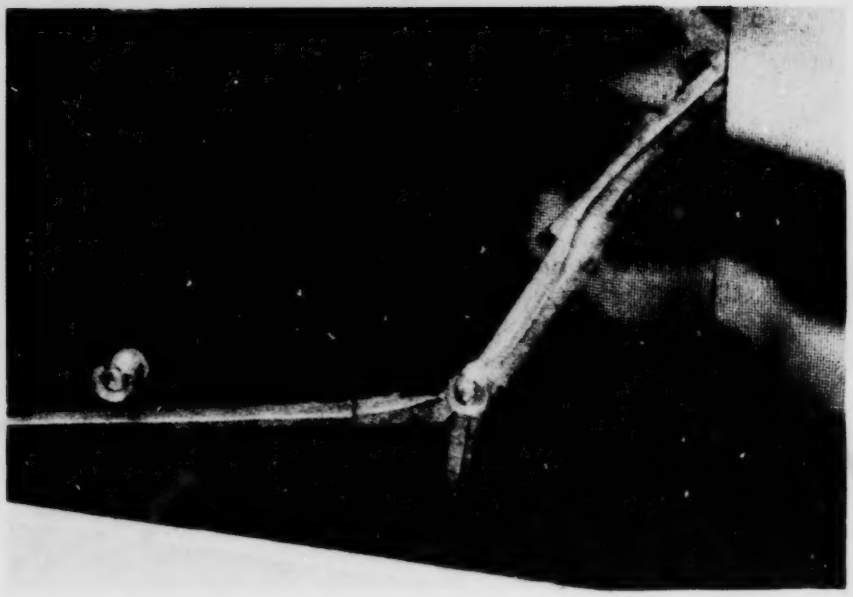


FIGURE 13a

FIGURE 13b

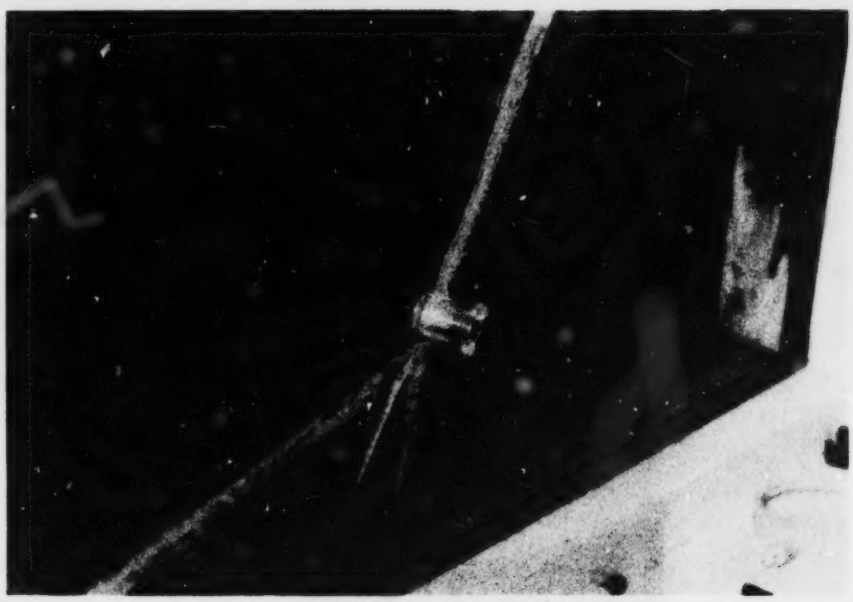


FIGURE 13c

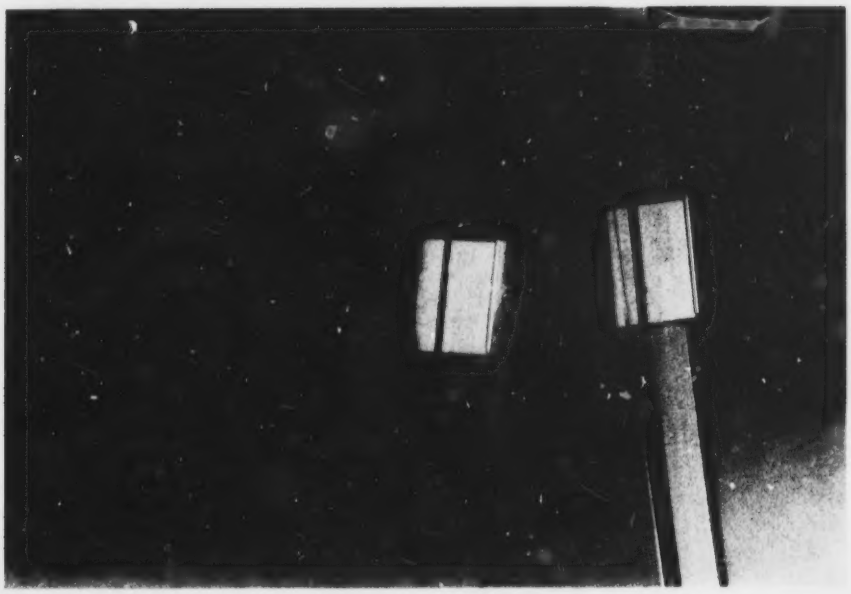
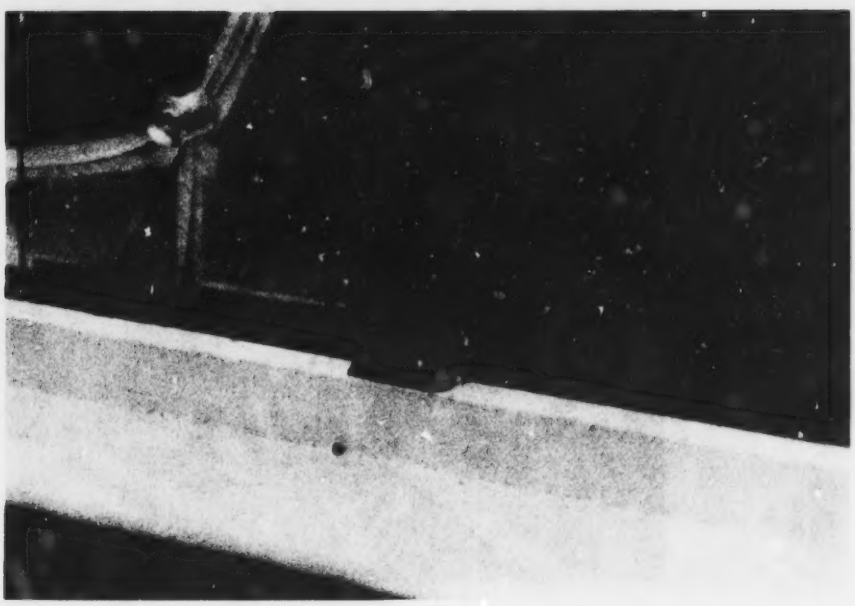


FIGURE 13d



3.2.3 Wood/Vinyl Horizontal Slider (Semi-Sashless)

- Extensive water penetration was evident at window sill corners (See Figure 14)
- Dry rot was visible at window sill corners and appeared to be caused by water accumulation and inadequate slope (See Figure 15)
- Widespread breakage and vinyl edge extrusions, peeling away from glass was a common occurrence (See Figure 16)
- Air infiltration at interlock, especially during winter months, was a major complaint (See Figure 17)
- Plaster or drywall reveal damage was prevalent primarily at interior corners below the window unit (See Figure 18)
- Replacement extrusions were often difficult to obtain and sometimes non-existent on a retrofit basis
- Plastic hardware breakage was extensive, making window security inadequate (See Figure 19)
- Some window panes had a tendency to fall out of their frames due to upper sill track sticking in the depressed position.

FIGURE 14

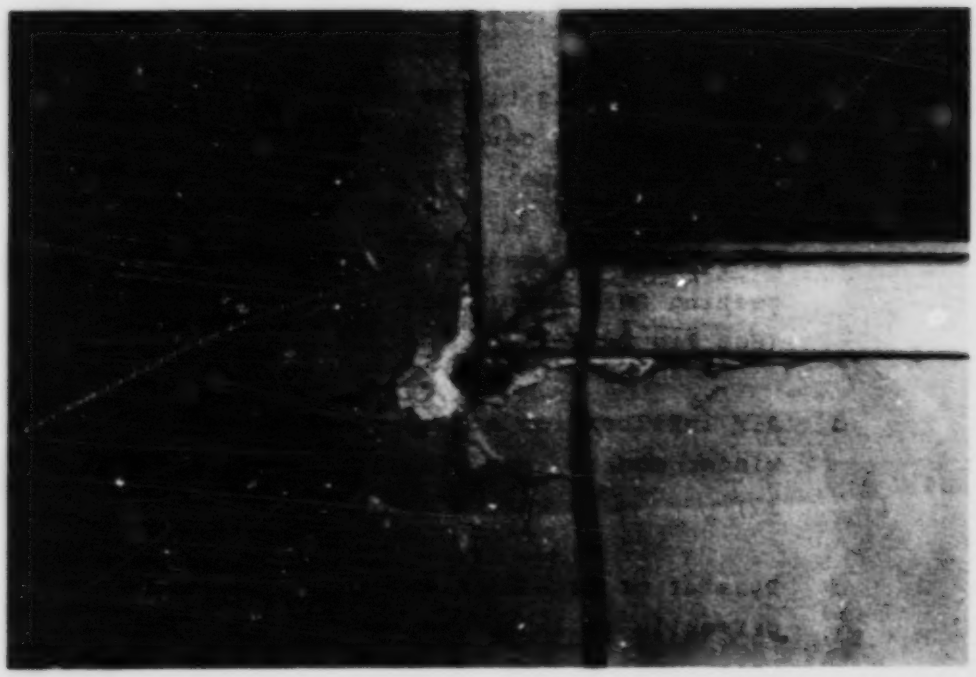


FIGURE 15

FIGURE 16

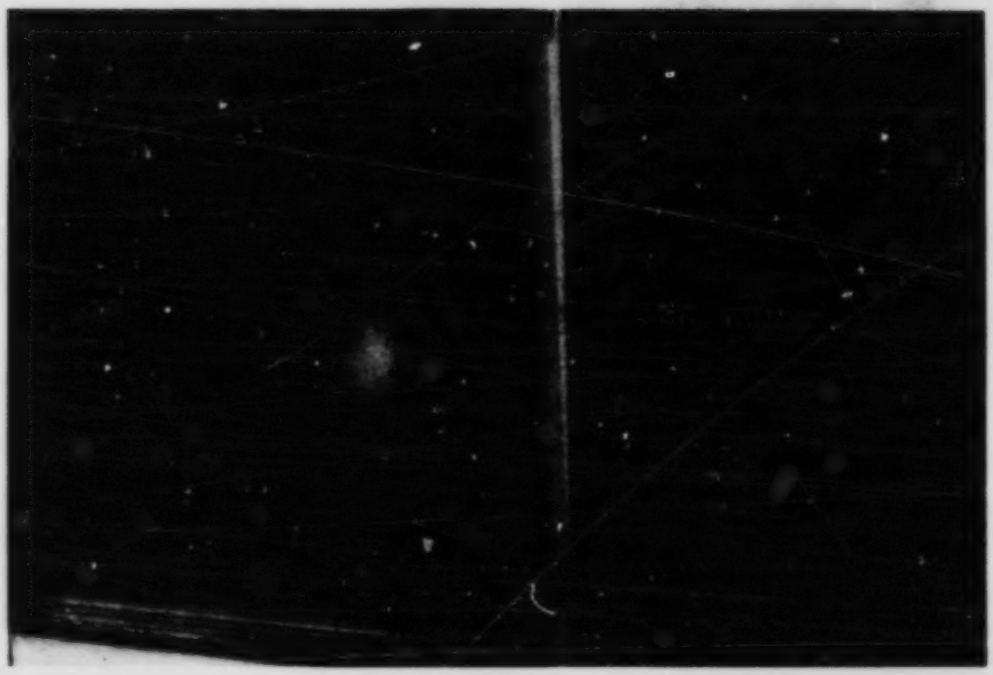


FIGURE 17

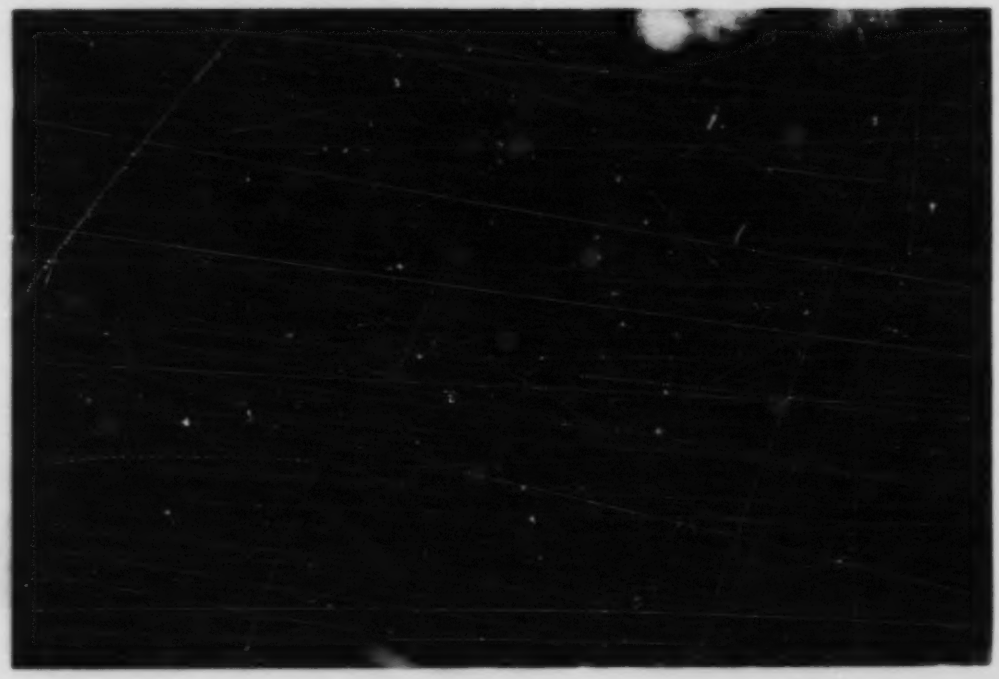


FIGURE 18

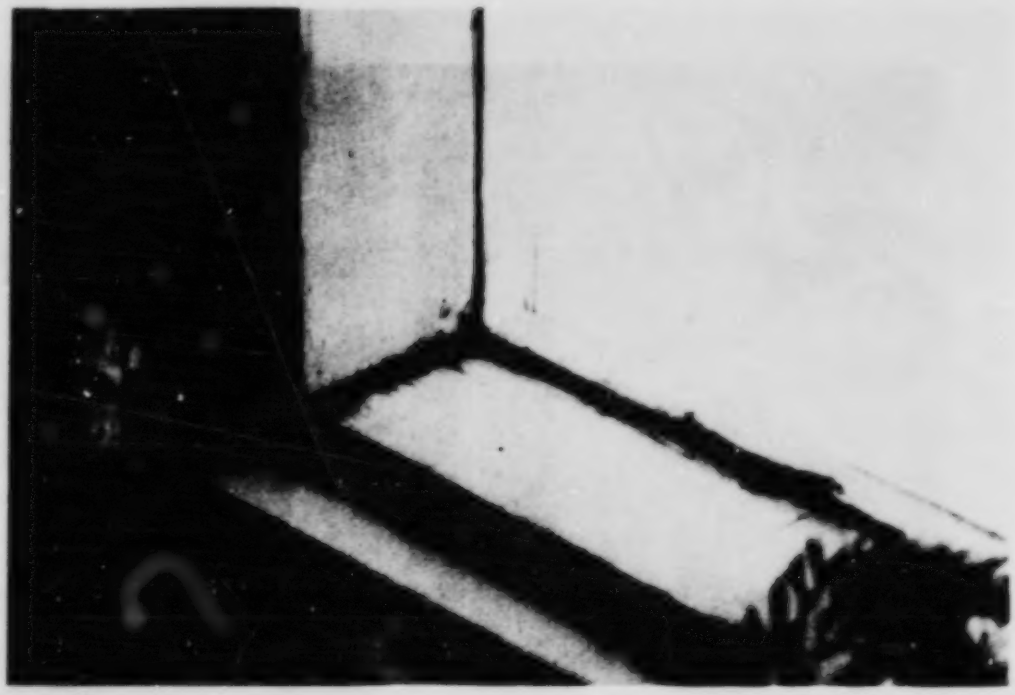


FIGURE 19

3.2.4 Wood/Vinyl Horizontal Sliders (Sashed)

- Dry rot occurred extensively at window frame sill corners due to water accumulation and insufficient slope (See Figures 20, 21 and 24)

- Water penetration was commonly evident at interior sill corners (See Figures 22 and 23)

- Weatherstripping was not utilized in these units, making them drafty at the interlock (See Figure 26)

- Plaster and drywall reveal deterioration was frequently observed at the interior corners below the window (See Figure 22)

- Vinyl extrusion breakage was common and replacements difficult to obtain (See Figure 25)

- Plastic hardware was highly prone to breakage, making security from forced entry suspect (See Figure 26).

FIGURE 20

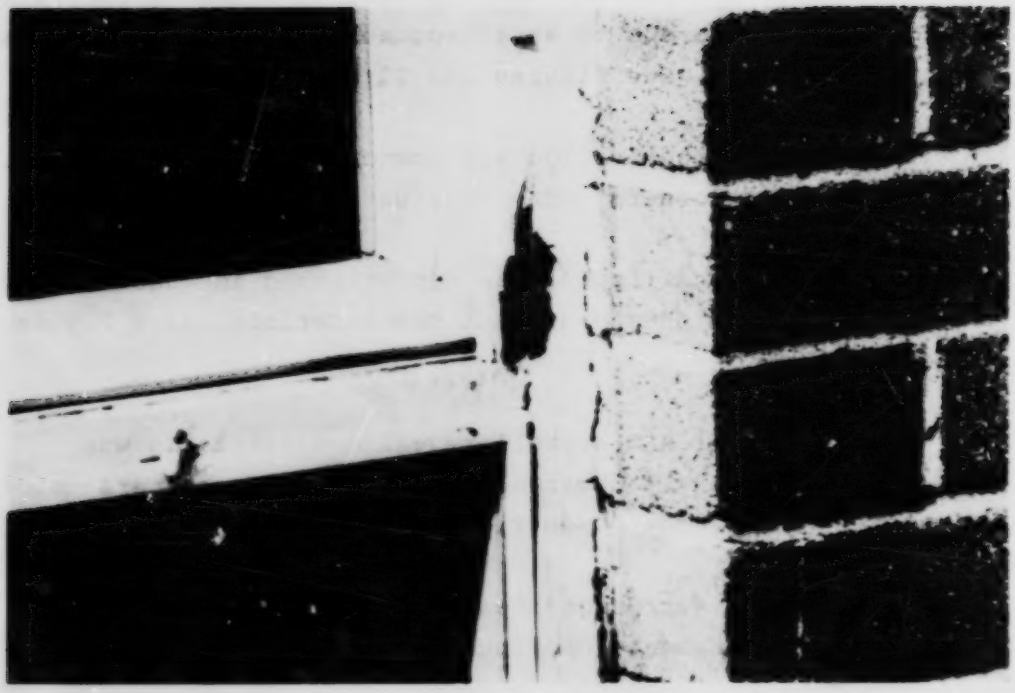


FIGURE 21

FIGURE 22

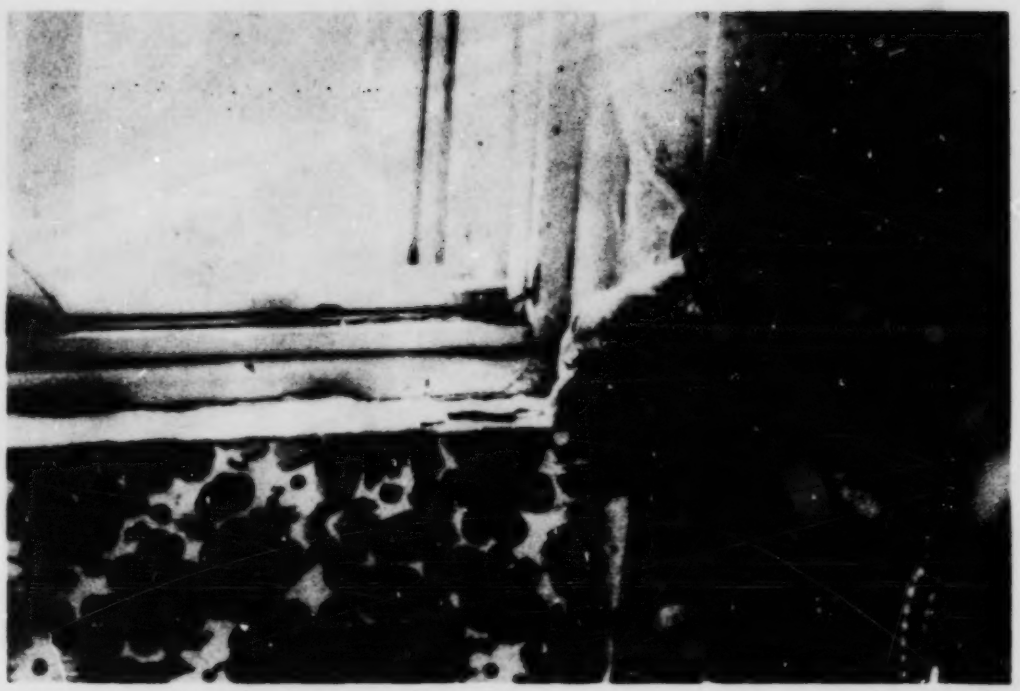


FIGURE 23

FIGURE 24

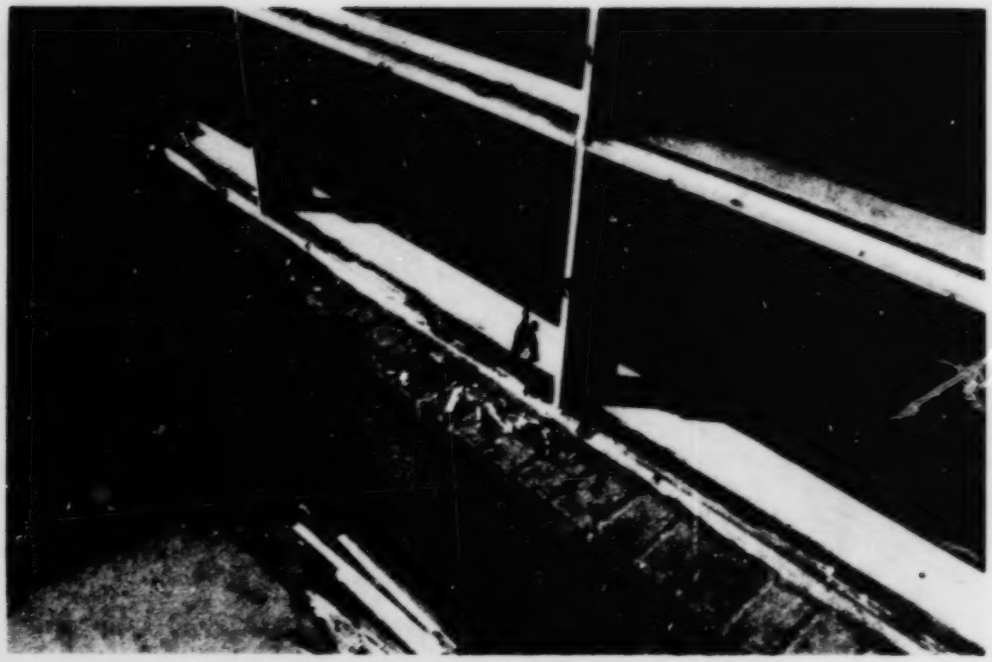


FIGURE 25

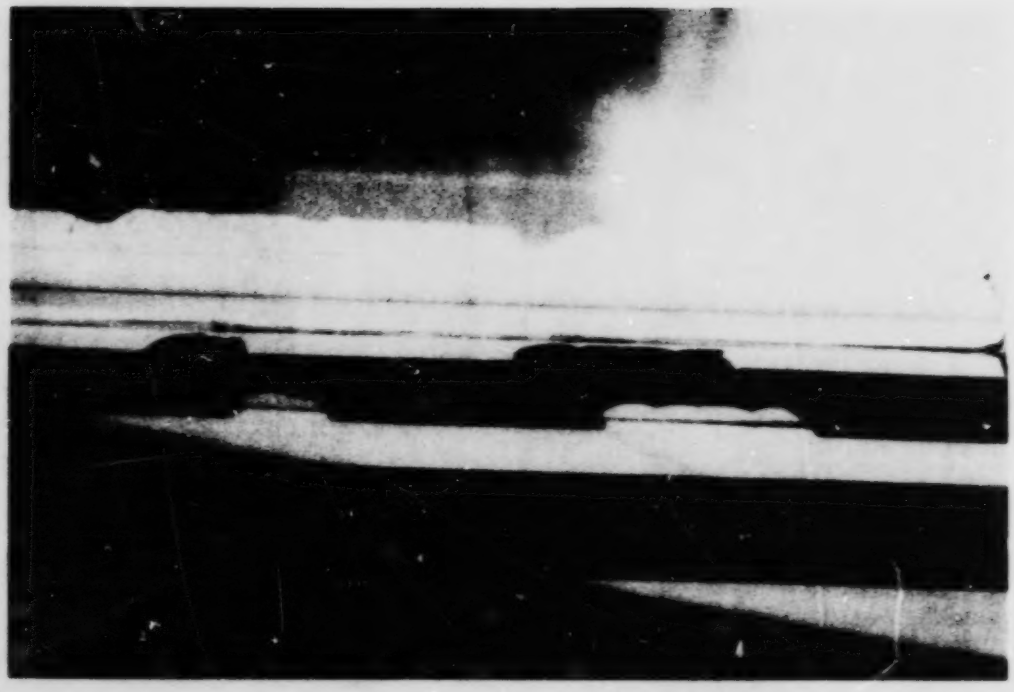
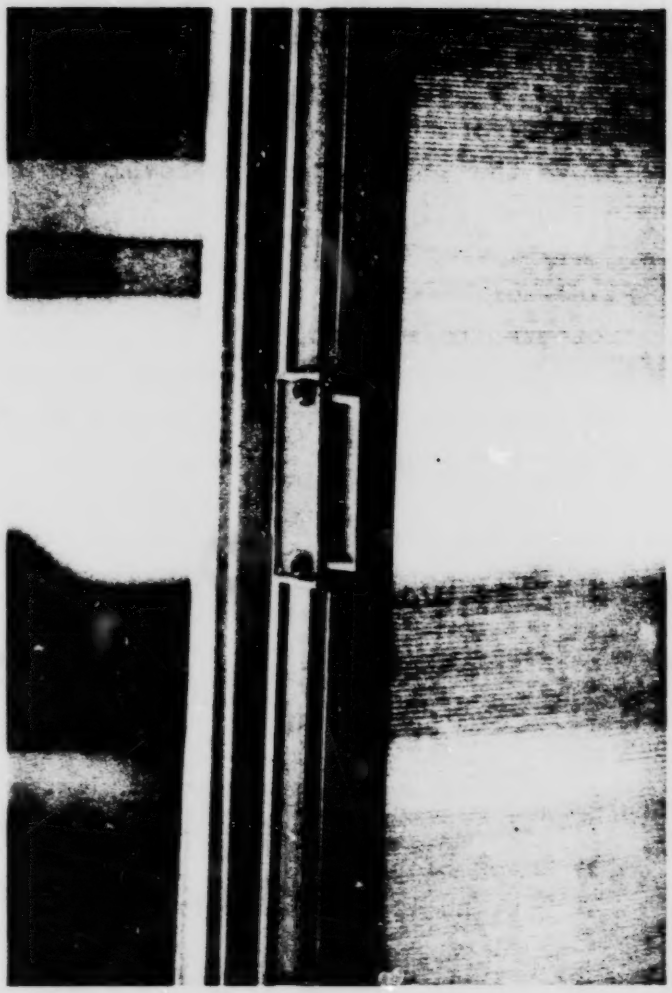


FIGURE 26



3.3 Safety Latching Devices

A window safety latch is an engaging device which restricts the operable window opening to a 100 mm (4") minimum width.

The 1975 Ontario Building Code Part 3 requires safety latch-in devices be installed in residential buildings that exceed 600 m^2 (6,000 sq. ft.) and are over three storeys in building height. The Code reads "Windows in Group 'C' occupancies, located more than 1.8 m. (6 ft.) above the adjacent ground level and extending to within 750 mm (30") of the floor are required to be

- Fixed or
- Protected by a guard or
- Provided with a latching device and screen or
- Provided with an alternate device which does not reduce the degree of safety."

There are three (3) major types of safety latches which are currently on the market.

They are namely:

3.3.1 Types

1) Spring loaded arm stopper device (Figure 27)
2) Spring loaded barrel bolt (Figure 28)
3) Stop block (Figure 29)
4) Spring loaded variations (Figure 30)

3.3.2 Locations

The installation locations on a typical window frame are illustrated in Figure 31 as follows:

FIGURE 27

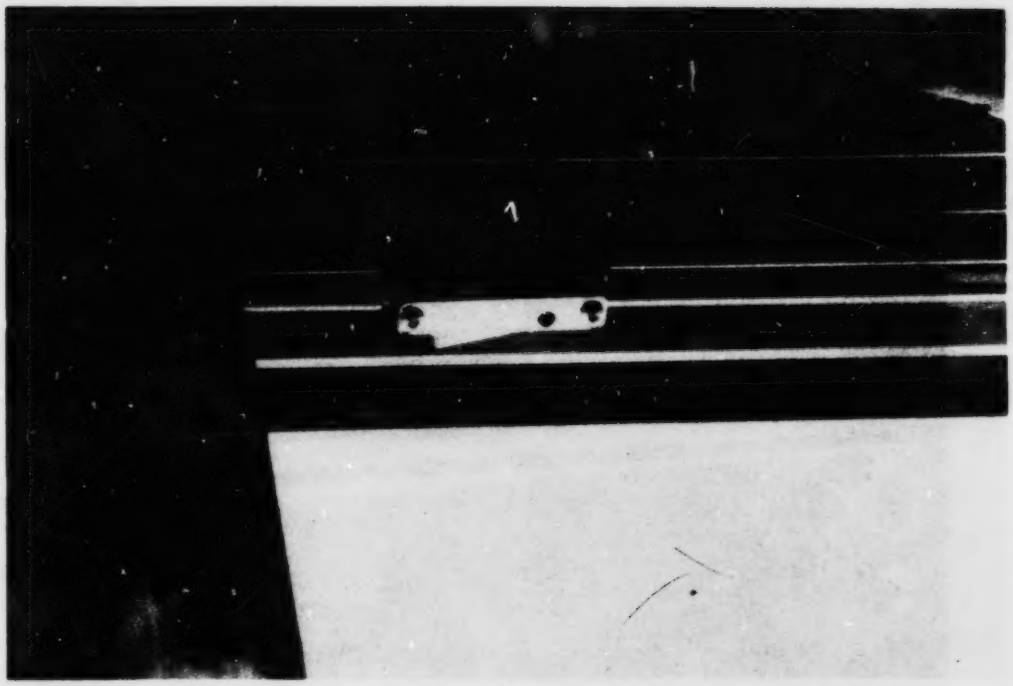


FIGURE 28

FIGURE 29

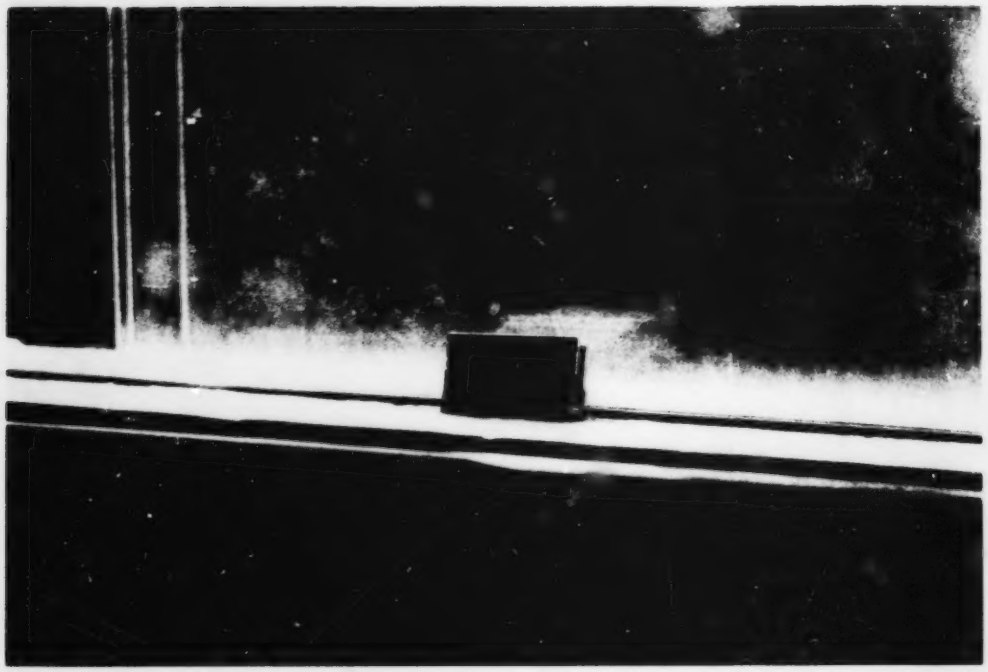
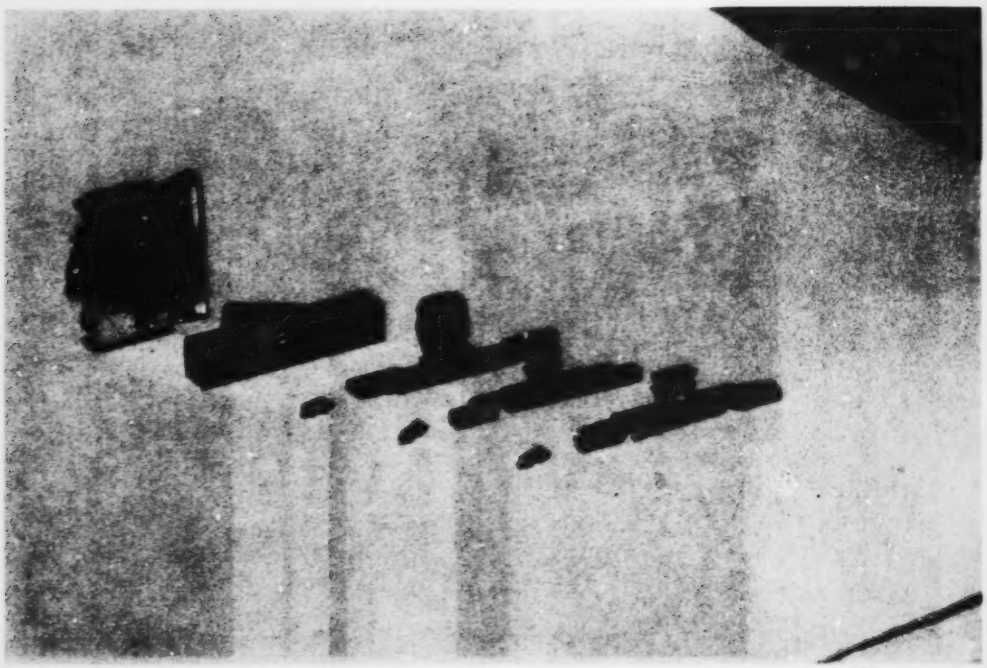


FIGURE 30



Type	Window Frame Location
1) Spring loaded arm device	Head Rail
2) Spring loaded barrel bolt	Meeting Stile
3) Stop Block	Sill Rail

In reviewing the different types of safety latches, it became apparent that the spring loaded devices offered better window opening flexibility in terms of disengagement than the stop block method.

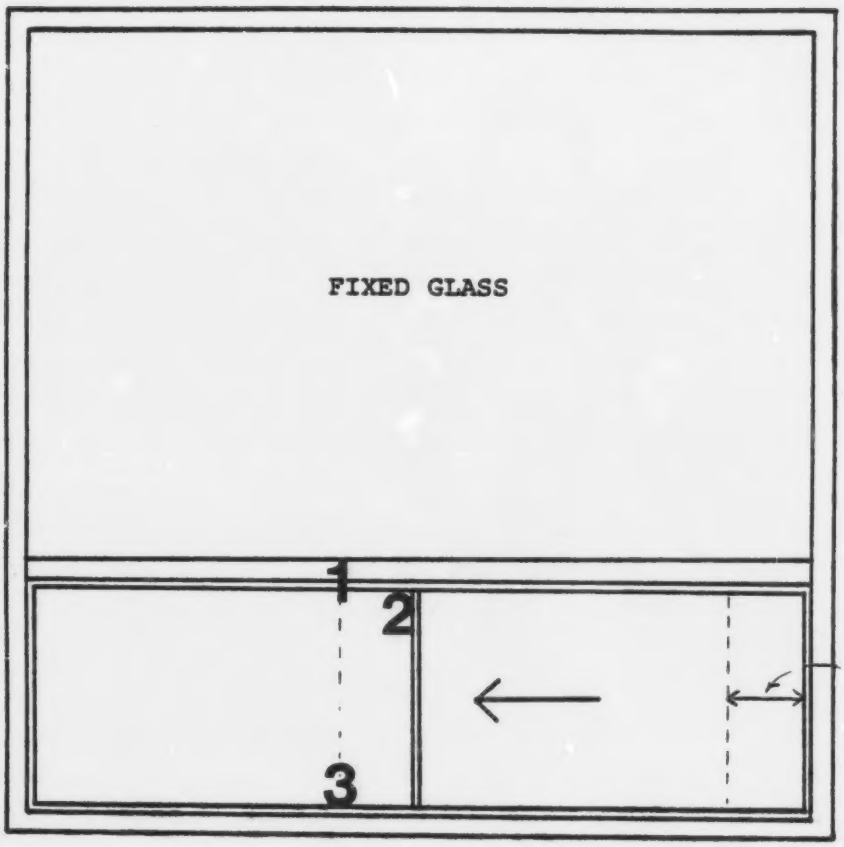
On the other hand, window types such as vinyl horizontal sliders can only utilize a stop block safety device because of the difficulty of attachment to the window frame. The prime disadvantage of the device is that it cannot be disengaged by the tenant to allow increased ventilation by opening - unless it is removed using an Allen wrench.

Some aluminum sliders available in today's market have a safety latch located on the upper outside frame making it impossible to unfasten the device.

Finally, another concern regarding safety devices is the horizontal vinyl Thermo slider equipped with only one (1) safety latch on the operating leaf adjacent to the half screen. This provides an unimpeded opening on the opposite non-operating leaf to the exterior. It is therefore imperative to ensure that two (2) safety latches be installed on the upper frame to protect both the operating and non-operating window lights as per Figure 32.

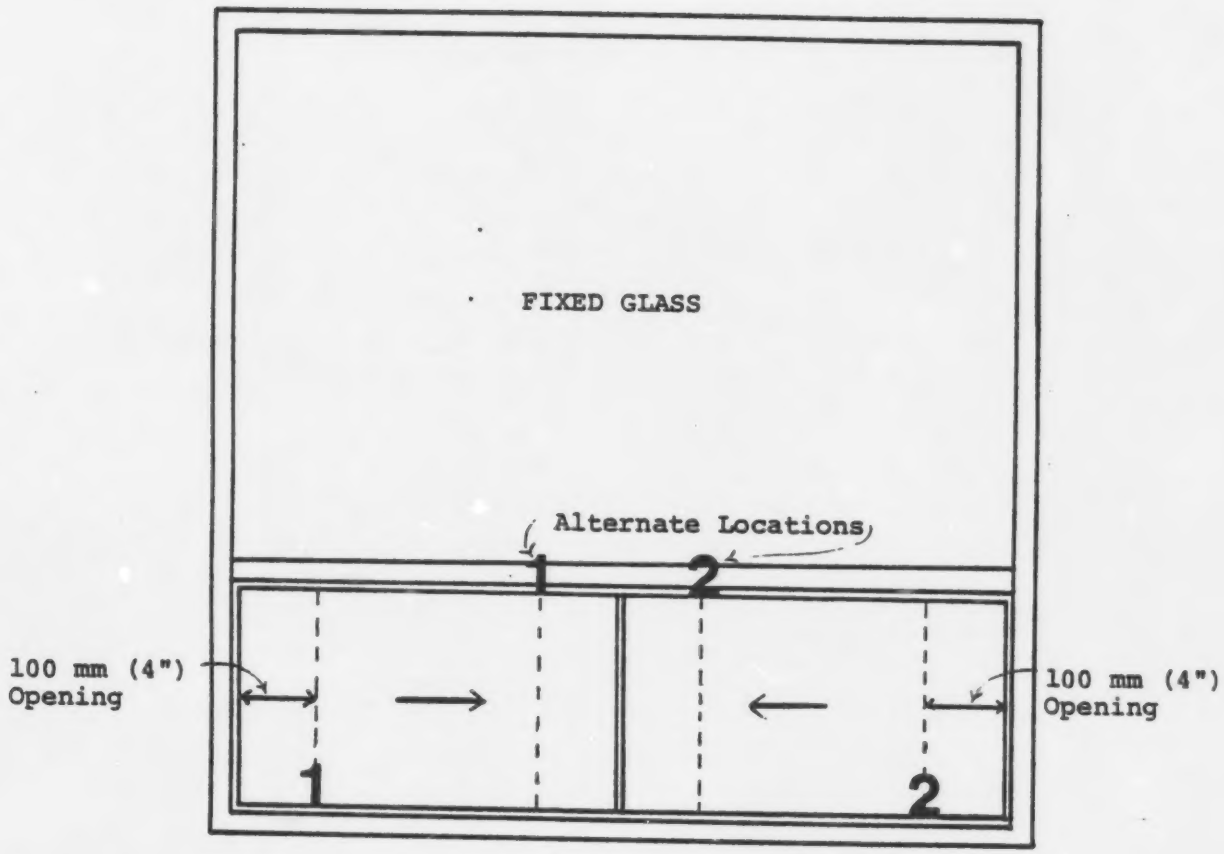
In general, most of the tenants looked upon these safety devices as a nuisance that restricted their path of natural ventilation.

FIGURE 31 SAFETY LATCH LOCATIONS



LOCATION		TYPE OF DEVICE
1)	Head Rail	Spring loaded arm device
2)	Meeting Stile	Spring loaded barrel bolt
3)	Sill Rail	Stop Block

FIGURE 32 SAFETY LATCH LOCATIONS FOR THERMO SLIDING WINDOWS



LOCATION		TYPE OF DEVICE
1)	Head Rail (Left)	Stop Block
2)	Head Rail (Right)	Stop Block

3.4 Examples of Window Replacement Projects

Two (2) window replacement projects before and after photographs are shown for the following existing window types:

Figures 33 and 34 aluminum horizontal slider (wood frame)

Figures 35 and 36 vinyl/wood horizontal slider.

In both cases the old installations were drafty, leaky units, but the prime reason for window replacement was dry rotting of the sill frame. To rectify this problem Ontario Housing Corporation, on a renovation basis, has combined extruded aluminum sills (to protect rough bucks) (Figure 37) with a high quality (C.G.S.B. 63-GP-2) composite Thermo horizontal aluminum slider (See Figures 34 and 36).

A listing of the main O.H.C. retrofit window manufacturers along with the window types and governing standards are summarized in Table V. See page 50.

A window shop drawing checklist, Appendix "F" page 90, was also developed to aid Construction Inspection and Maintenance staff in reviewing shop drawing and tender submissions.

FIGURE 33 **BEFORE**

FIGURE 34 **AFTER**

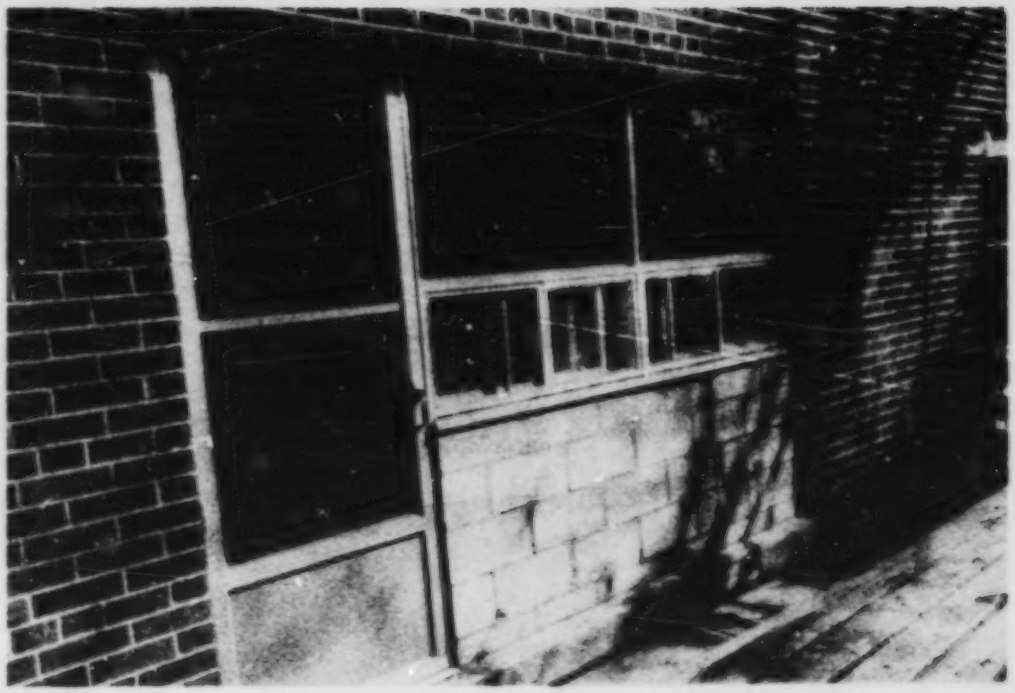


FIGURE 35 **BEFORE**

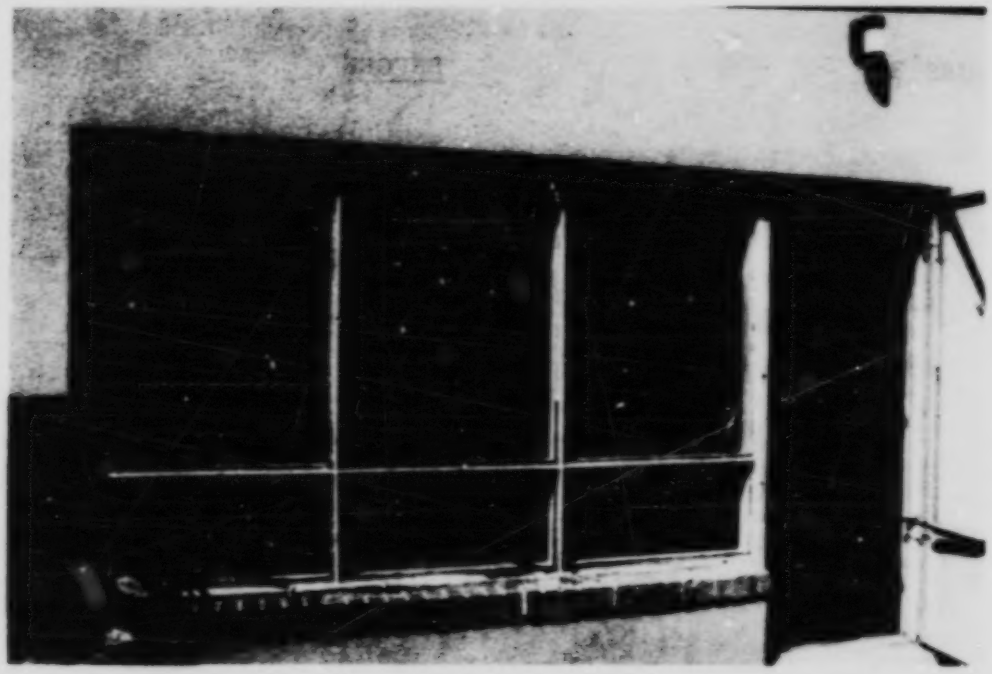
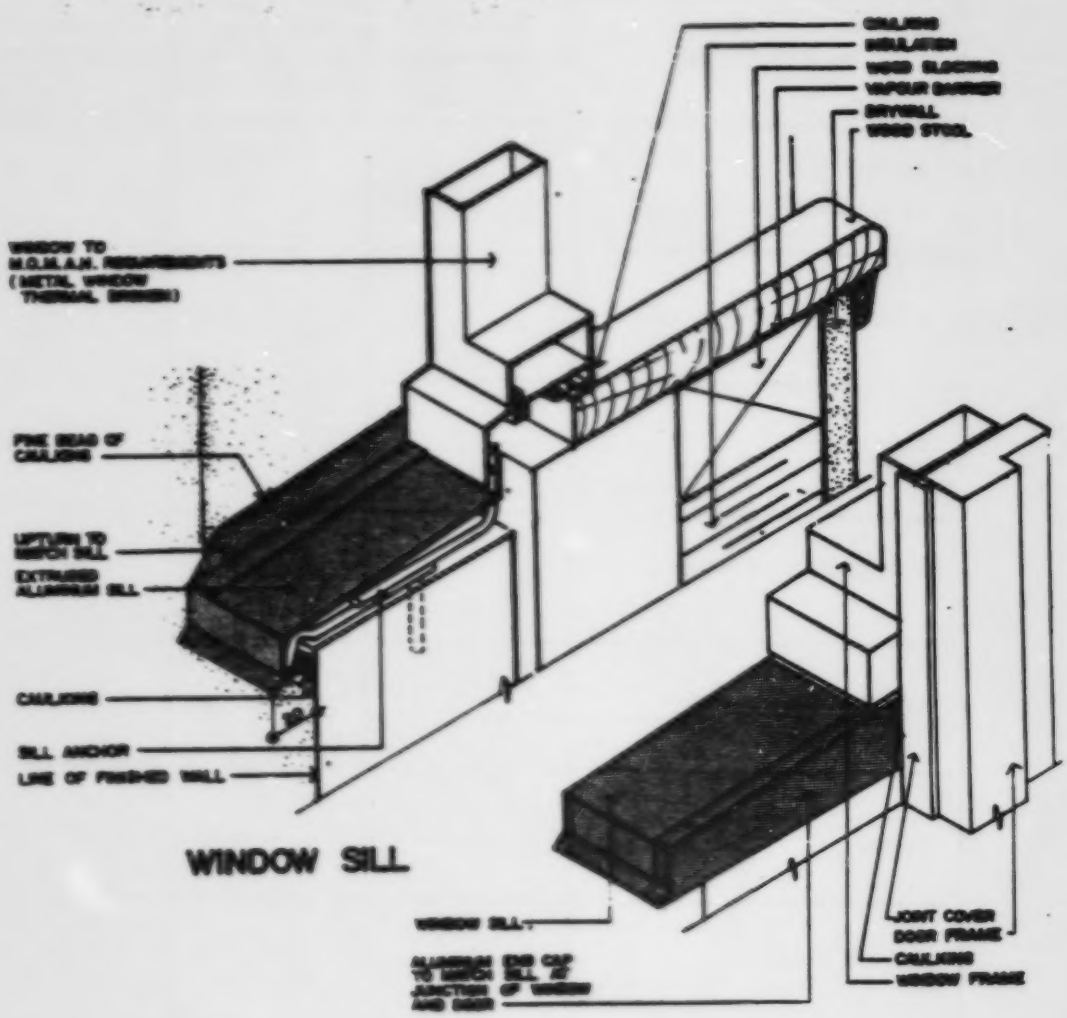


FIGURE 36 **AFTER**

FIGURE 37



WINDOW SILL

TABLE V

SUMMARY OF MAJOR O.H.C. RETROFIT WINDOW MANUFACTURERS

MANUFACTURER	WINDOW TYPE		MATERIAL			STANDARDS	
	HORIZ. SLIDER	VERT. SLIDER	WOOD	VINYL	ALUM	C.S.A. 0132-1	C.G.S.B 63-GP-2
ACORN (GUARDLINE INDUSTRIES)	o				o		o
ALUMEX INDUSTRIES LTD.	o				o		o
ALUMICOR	o				o		o
ALUMIPRIME (INDAL)	o				o		o
ALSCO (ALCAN)	o				o		o
ARROW	o				o		o
CUSTOM GLASS	o				o		o
FULTON WINDOWS	o				o		o
MODULAR	o				o		o
NATIONAL ALUMINIUM	o				o		o

TABLE V (Cont'd)

SUMMARY OF MAJOR O.H.C. RETROFIT WINDOW MANUFACTURERS

MANUFACTURER	WINDOW TYPE		MATERIAL			STANDARDS	
	HORIZ. SLIDER	VERT. SLIDER	WOOD	VINYL	ALUM	C.S.A. 0132-1	C.G.S.B 63-GP-2
SENTINAL	o				o		o
THU-VIEW ALUM.	o				o		o
THERMO PANORAMIC		o			o		o

PART IV - CONCLUSIONS

1) The major cause of window deterioration is dry rot resulting from standing water accumulation and lack of sill slope to the exterior. This in turn causes paint to peel, caulking to deteriorate and moisture to penetrate the window unit.

2) The prime location of window failure occurred at the window sill due to excessive moisture penetrating the corner junctures.

3) Wood window installations are not recommended for public housing projects for two reasons:

   a) Requirement for periodic painting

   b) The susceptibility to deterioration since they are more difficult to maintain.

4) Sashless wood horizontal slider was perhaps the worst performing window with 94% of sampling showing signs of dry rot and air infiltration.

5) Vinyl/wood (semi-sashless) window was another low performing window with 91% air infiltration rate and 64% extrusion breakage.

6) The practice of upgrading existing windows with aluminum storms (i.e. aluminum storm added to steel casement) should be closely scrutinized on public housing buildings. Often projects are retrofitted initially and then totally replaced some years later.

7) When purchasing window units for multi-storey buildings, safety latching devices should be

carefully reviewed to ensure that there are no unimpeded openings especially with vinyl Therмo windows.

8) Wooden window frames or (rough bucks) on new or retrofit projects should be protected by an extruded aluminum sill to avoid the number one performance problem dry rotting.

APPENDIX "A"

CONSTRUCTION MANAGER'S WINDOW PERFORMANCE QUESTIONNAIRE

Please check ✓

1) BUILDING LOCATION:

Project Name and O.H. Number _____

Civic Address _____

_____

2) OCCUPANTS:

○ Senior Citizens OR ○ Family

3) BUILDING TYPE:

○ Highrise Apt. (over 6 stories)
○ Lowrise Apt.
○ Town/Row
○ Semi
○ Single

4) BUILDING HEIGHT:

Number of Stories _____.

5) BUILDING AGE:

Number of Years _____.

6) TYPE OF WINDOW INSTALLATION:

○ Aluminum
○ Steel
○ Wood
○ Vinyl
○ Other (specify)_____.

7) WINDOW OPERATION:

○ Horizontal Slider
○ Vertical Slider
○ Other (specify)_____.

8) ARE YOU EXPERIENCING ANY PROBLEMS WITH ACTUAL PHYSICAL INSTALLATION OF THE WINDOW UNIT DURING CONSTRUCTION?

○ YES ○ NO

If YES, please specify _____.

9) LIST ANY PERFORMANCE RELATED WINDOW PROBLEMS (i.e. VISIBLE DETERIORATION, STRUCTURAL DEFORMATION, EXPANSION BREAKAGE, CAULKING FAILURE, EASE OF OPERATION, WATER PENETRATION, CONDENSATION, AIR INFILTRATION AND FROST PENETRATION, etc.)

1)

2)

3)

4)

5)

(If more space is needed, attach a separate sheet)

10) ARE WINDOW *SAFETY CATCHES INSTALLED ON THE ABOVE NOTED WINDOWS?

○ YES ○ NO

*A safety catch is an engaging device which restricts the operable window opening to a maximum of 100mm (4") width.

If YES, describe the type of mechanism -

_____

_____

_____

O.H.C. PROPERTY MANAGEMENT WINDOW PERFORMANCE QUESTIONNAIRE

Please check ✓

1) BUILDING LOCATION:

Housing Authority _____

Project Name and O.H. Number _____

Civic Address _____

2) OCCUPANTS:

○ Senior Citizens OR ○ Family

3) BUILDING TYPE:

○ Highrise Apt. (Over 6 stories)
○ Lowrise Apt.
○ Town/Row
○ Semi
○ Single

4) BUILDING HEIGHT:

Number of Stories _____.

5) BUILDING AGE:

○ 1 to 5 years
○ 5 to 10 years
○ 10 to 15 years
○ Over 15 years

6) TYPE OF WINDOW INSTALLATION:

○ Aluminum
○ Steel
○ Wood
○ Vinyl
○ Other (specify)_____.

7) TYPE OF WINDOW SASH:

○ Fully Sashed
○ Semi-Sashless
○ Sashless

8) LIST THE PERFORMANCE PROBLEMS (i.e. VISIBLE DETERIORATION, EXPANSION BREAKAGE, CAULKING FAILURE, EASE OF OPERATION, AIR INFILTRATION, WATER PENETRATION AND FROST PENETRATION,etc.)

1)

2)

3)

4)

5)

(If more space is needed, attach a separate sheet)

9) METHOD OF WINDOW OPERATION:

○ Horizontal Slider ○ Vertical Slider

○ Other (specify) _____.

10) ARE WINDOW *SAFETY CATCHES INSTALLED ON THE ABOVE NOTED WINDOWS?

○ YES or ○ NO

* A safety catch is an engaging device which restricts the operable window opening to a maximum of 100mm (4") width.

APPENDIX "B"

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: NORTHWESTERN ONTARIO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) DINORWIC 10 F.H.U.	Wood/Vinyl Horiz. Sliders (Semi Sashless)	- High air infiltration (Drafty) - Vinyl edge extrusions breaking down (Replacements difficult to obtain) - Condensation	8
2) DRYDEN OH-3 61 S.C.U.	Wood/Vinyl Horiz. Sliders Semi sashless	- Vinyl sash deterioration - Difficulty obtaining extrusions - High levels of air infiltration - Reveal deterioration	8
3) DRYDEN OH-1 10 S.C.U.	Wood Sashless Horiz. Sliders	- Drafty - High air infiltration - Condensation - Deterioration of sill - Reveal deterioration	14
4) EAR FALLS OH-2 20 F.H.U.	Wood Sashless Horiz. Sliders	- Drafty Windows - Deterioration of Wood Frames - Condensation - Reveal deterioration	7
5) FORT FRANCES OH-3 14 F.H.U.	Vinyl/Wood Horiz. Sliders Semi Sashless	- High levels of air infiltration - Vinyl extrusions breaking down - Condensation - Reveal deterioration	14
6) KENORA OH-3 36 F.H.U.	Semi Sashless Vinyl Horiz. Sliders	- Extrusion replacement difficult to obtain - Drafty at interlock - Condensation - Reveal deterioration	12
7) FORT FRANCES OH-5 26 F.H.U.	Alum. Horiz. Sliders	- Deterioration of Reveals - Condensation - Air infiltration	11
8) KENORA OH-4 40 S.C.U.	Living Room Fixed Glazing With Removable Storm	- Replacement with Thermopane being considered - Window cleaning a problem (Number of glass surfaces)	8
9) KENORA OH-2 22 S.C.U.	Horiz. Wood Slider	- Deterioration of sills started - Condensation on inside glass surface frosting in the winter - Unopenable	16
10) RED LAKE OH-3 10 F.H.U.	Alum. Horiz. Sliders	- Air infiltration - Condensation - Aluminum extrusions difficult to obtain	9

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: NORTHERN ONTARIO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) COCHRANE OH-1 30 F.H.U.	Alum. Horiz. Sliders	- Drafty - Extrusions no longer available - Security locking problems	14
2) COCHRANE OH-3 16 F.H.U.	Alum. Horiz. Sliders	- Drafty - Condensation - Difficulty obtaining replacement extrusions	8
3) KAPUSKASING OH-5 66 S.C.U.	Alum. Horiz. Sliders	- Thermal break problems - Frost occurring on interior window frames during the winter - Air infiltration	4
4) KIRKLAND LAKE OH-102 66 S.C.U.	Alum. Horiz. Sliders	- Drafty - Condensation - Deterioration of Reveals	6
5) SAULT STE. MARIE FP/1 100 F.H.U.	Wood Double Hung Vertical Sliders	- Wooden sills and meeting rail rotting out - Inoperable (Difficult to open)	30
6) SAULT STE. MARIE OH-15 133 S.C.U.	Alum. Horiz. Sliders	- Seniors have difficulty in opening large sliding windows - Hard to clean	7
7) PARRY SOUND OH-3 5 S.C.U.	Alum. Horiz. Sliders	- Full height windows that are hard to open - Difficult to clean	3
8) SAULT STE. MARIE OH-6 26 F.H.U.	Alum. Sliders in Plastic Track	- Plastic sill track breaking down - Deterioration of wood sill	13
9) SUDBURY OH-2 20 S.C.U.	Wood (Sashless) Horiz.Sliders	- Air infiltration - Water penetration - Damage around reveals	17
10) SUDBURY OH-3 43 F.H.U.	Wood (Sashless) Horiz. Sliders	- Air infiltration - Water penetration - Interior reveal damage	16

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: EASTERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) BROCKVILLE OH-5 82 S.C.U.	Alum. Horiz. Sliders	- Water penetration around window frame - Window recaulked	9
2) CARLETON PLACE OH-7 40 S.C.U.	Wood/Vinyl Horiz. Sliders Semi sashless	- Structural deformation - Water penetration - Air penetration - Reveal deterioration	6
3) KINGSTON OH-12 61 S.C.U.	Alum. Horiz. Sliders	- Water penetration at window sill and sash - Failed air infiltration test - Corner seal failure	9
4) OTTAWA FP/4 104 F.H.U.	Wood Sashless Horiz. Sliders	- Dry rot wood frames - Air penetration - Drafty	19
5) OTTAWA OH-24 14 F.H.U.	Alum. Horiz. Sliders	- Insufficient capacity of weepholes on north and west exposure	13
6) PERTH OH-6 30 S.C.U.	Wood/Vinyl Horiz. Sliders (sashed)	- Slight deformation of window frame - Some breakage of hardware	2
7) KINGSTON OH-1 Scattered 30 F.H.U.	Horiz. and Vert. Sliders (Wood Frame)	- Dry rot of window sills - Air infiltration - Condensation built up on inside of glass pane	16
8) OTTAWA OH-34 207 S.C.U.	Wood/Vinyl Horiz. Sliders Semi Sashless	- Vinyl extrusions no longer available for replacement - Air infiltration (Drafty)	12
9) GANANOQUE OH-1 51 S.C.U.	Alum. Horiz. Sliders	- Water penetration around window frame - Recaulking required	8
10) BROCKVILLE OH-4 48 S.C.U.	Alum. Horiz. Sliders	- Water penetration through upper window frame	12

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: SOUTHERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) NIAGARA FALLS ON-4 200 S.C.U.	Alum. Horiz. Sliders	- Difficult for Seniors to open - Difficult to clean	5
2) DELHI FP/1 12 F.H.U.	Wood Sashless Horiz. Sliders	- Dry rot of window sill - Water penetration - Condensation	24
3) BRANTFORD ON-10 70 S.C.U.	Alum. Horiz. Sliders	- Thermo pane cracking - Condensation between window panes	5
4) HAMILTON ON-10 265 S.C.U.	Alum. Sliders Existing Alum. Sliders added to Interior	- Weep holes added to window frame - Condensation on interior frame - Breakdown of plaster between window units	14
5) HAMILTON ON-19 110 F.H.U.	Alum. Horiz. Sliders	- Extrusions replacement difficult to obtain	12
6) BURLINGTON ON-1 54 F.H.U.	Wood Sashless Sashless Horiz. Sliders	- Drafty (high heat losses) - Water penetration - Dry rot of sills	15
7) BURLINGTON ON-2 141 S.C.U.	Wood Sashless Horiz. Sliders	- Drafty (high heat losses) - Water penetration - Dry rot of sills	12
8) ST. CATHARINES ON-3 210 F.H.U.	Alum. Horiz. Sliders	- Extrusion aluminum no longer available - Rotting of sills - Deterioration of Reveals	16
9) ST. CATHARINES ON-6 80 F.H.U.	Wood Sashless	- Interior condensation - Drafty (Windows rattle) - Deterioration of Reveals	13
10) WELLAND ON-1 50 F.H.U.	Wood Sashless Horiz. Slider	- Plastic sill track breaking down - Rotting sill - Reveal deterioration	14

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: SOUTHAMPTON

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1)			
CLINTON	Wood	- Out of square	
CH-1	Casement	- Stiff to open for Seniors (after repainting)	12
18 S.C.U.			
2)			
LEAMINGTON	Alum.	- Dry rot of wood frame	
CH-1	Vert. Slider	- Air infiltration	15
16 F.H.U.	Wood Frame	- Water penetration	
3)			
GODERICH	Wood (Sashless)	- Dry rot of sills	
CH-2	Horiz. Sliders	- Stiff to open by Seniors	14
12 S.C.U.		- Drafty	
		- Water penetration	
4)			
LONDON	Sashless	- Dry rot of wood sill	
FPH/57	Wood	- Drafty	26
100 F.H.U.	Horiz. Sliders	- Interior Condensation	
		- Reveal deterioration	
5)			
LONDON	Alum.	- Thermo break problems	
CH-9	Horiz. Sliders	- Frosting on interior frame during the winter	13
126 S.C.U.	(Single glazed)	- Condensation	
6)			
LONDON	Vinyl	- Breakdown of vinyl extrusions	
(CASCADE AVE)	Semi sashless	- Replacement extrusions no longer available	
34 F.H.U.	Horiz. Sliders	- Drafty, Reveal deterioration	15
7)			
STRATFORD	Alum.	- Extrusions not available	
CH-1	Horiz. Sliders	- Dry rot of sill	15
48 F.H.U.		- Drafty	
8)			
STRATFORD	Double hung	- Rot of meeting rail and sill	
FP-1	Wood	- Condensation on interior	31
22 F.H.U.			
9)			
STRATFORD	Double hung	- Rot of sill and meeting rail	
FP-2	Wood	- Glass separating from frame	29
14 F.H.U.		- Condensation	
10)			
WINDSOR	Wood	- Drafty	
CH-4	Sashless	- Rotting of window sill	12
16 S.C.U.	Horiz. Slider	- Deterioration of Reveals	

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF PROPERTY MANAGEMENT WINDOW PERFORMANCE SURVEY

LOCALITY: CENTRAL

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1)			
PORT CREDIT	Alum.	- Will not accommodate air conditioner	
ON-1	Horiz. Sliders	- Drafty	10
98 S.C.U.	Semi Sashless		
2)			
BARRIE	Steel	- Moisture condensation between thermal	
ON-6	Horiz. & Vert.	seal	10
91 S.C.U.	Sliders	- Difficulty in opening	
		- Difficulty in cleaning	
3)			
MISSISSAUGA	Alum.	- Caulking cracking around window frame	
ON-2	Horiz. Sliders	- Air infiltration	5
60 S.C.U.		- Water penetratin	
4)			
MISSISSAUGA	Alum.	- Water penetration through window frame	
ON-5	Horiz. Sliders		12
114 S.C.U.			
5)			
GUELPH	Sashless	- Locks are poor design. Drafty	
ON-7	Wood	- Hard to slide for elderly	10
100 S.C.U.	Horiz. Sliders	- Glass tends to break in winter	
		- Hard to remove for cleaning	
6)			
BRAMPTON	Alum.	- Water penetration	
ON-1	Horiz. Sliders	- Condensation on windowsills	10
98 F.H.U.		- Deterioration of reveals	
7)			
WHITBY	Sashless	- Dry rot of sill	
ON-2	Wood	- Air infiltration and water penetration	15
16 S.C.U.	Horiz. Sliders	- Deterioration of reveals	
8)			
SHELBURNE	Sashless	- Dry rot of sill	
ON-2	Wood	- Air infiltration	11
20 S.C.U.	Horiz. Sliders	- Water penetration	
9)			
PORT PERRY	Sashless	- Dry rot of sill	
ON-1	Wood	- Drafty (air infiltration)	9
30 S.C.U.	Horiz. Sliders	- Water penetration with deterioration of reveals	
10)			
BOWMANVILLE	Sashless	- Dry rot of sill	
ON-3	Horiz. Sliders	- Drafty	14
14 S.C.U.		- Water penetration with deterioration of reveals	

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF CONSTRUCTION MANAGER'S WINDOW PERFORMANCE SURVEY

LOCALITY: NORTHERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) FIELD OH-1 22 S.C.U.	Alum. Horiz. Slider	- Nil	2
2) MATTICE OH-1 15 S.C.U.	Wood Horiz. Slider	- Nil	2
3) ENGLEHART OH-4 29 S.C.U.	Alum. Horiz. Slider	- Nil	2
4) WARREN OH-1 19 S.C.U.	Alum. Horiz. Slider	- Nil	2
5) ST. CHARLES OH-1 23 S.C.U.	Alum. Horiz. Slider	- Nil	2
6) HAILEYBURY OH-2 14 S.C.U.	Alum. Horiz. Slider	- Nil	2
7) CAMPBELLFORD OH-4 24 S.C.U.	Vinyl Horiz. Slider	- Structural deformation due to the movement of the vinyl headrail - Difficulty meeting water penetration test	2
8) KIRKLAND LAKE OH-7 49 S.C.U.	Alum. Horiz. Slider	- Insufficient space at window head for insulation - Top portion of window deformed when insulated	2

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF CONSTRUCTION MANAGER'S WINDOW PERFORMANCE SURVEY

LOCALITY: NORTH WESTERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) THUNDER BAY OH-22 22 S.C.U.	Alum. Horiz. Slider	- Nil	2
2) KAPUSKASING OH-5 49 S.C.U.	Alum. Horiz. Slider	- Condensation on interior of windows - Thermal break installed in line with air space - Cold air can traverse behind thermal break causing condensation on interior frame	5

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF CONSTRUCTION MANAGER'S WINDOW PERFORMANCE SURVEY

LOCALITY: EASTERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1)			
ARNPRIOR	Alum.	- Condensation between one thermo pane	
ON-7	Horiz.		3
41 S.C.U.	Slider		
2)			
KALADAR	Wood/Vinyl		
ON-3	Horiz. Slider	- Nil	2
25 S.C.U.	(Sashed)		
3)			
PERTH	Wood/Vinyl	- Deterioration of spring loaded hardware	
ON-6	Horiz. Slider	- Stop-Block safety latches installed on	3
30 S.C.U.	(Sashed)	windows overlooking balconies	
4)			
ALEXANDRIA	Wood/Vinyl		
ON-3	Horiz. Slider	- Nil	3
30 S.C.U.	(Sashed)		
5)			
RUSSELL	Wood/Vinyl		
ON-1	Horiz. Slider	- Nil	3
30 S.C.U.	(Sashed)		
6)			
CAMPBELLFORD	Wood/Vinyl	- Deterioration of wood frame	
ON-2	Horiz. Slider	- Breaking down of vinyl sashes	10
30 S.C.U.	(Sashed)	- Condensation	
7)			
ARNPRIOR	Alum.	- Stiff action to operate window	
ON-5	Horiz.	- Difficult to remove windows	4
54 S.C.U.	Slider	- Some frost visible on interior frame	
8)			
CARLETON	Alum.	- Weatherstripping not used in this	
PLACE	Horiz.	window unit	10
ON-3	Slider	- Drafty	
30 S.C.U.			
9)			
PERTH	Alum.	- Worn sill track and jambs	
ON-3	Horiz.	- Cold air penetration during winter	9
27 S.C.U.	Slider	- Deterioration of weather stripping	

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

SUMMARY OF CONSTRUCTION MANAGER'S WINDOW PERFORMANCE SURVEY

LOCALITY: SOUTH WESTERN

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	AGE OF BLDG.
1) CHATSWORTH OH-1 22 S.C.U.	Alum. Horiz. Slider	- Nil	2
2) EGREMONT OH-1 16 S.C.U.	Alum. Horiz. Slider	- Nil	3
3) GODERICH OH-3 54 S.C.U.	Alum. Horiz. Slider	- Nil	3
4) HALDIMAND OH-1 15 S.C.U.	Alum. Horiz. Slider	- Nil	3
5) MIDLAND OH-9 40 S.C.U.	Alum. Horiz. Slider	- Nil	3
6) PORT COLBORNE OH-3 5 F.H.U.	Alum. Horiz. Slider	- Nil	3
7) SIMCOE OH-3 22 S.C.U.	Alum. Horiz. Slider	- Nil	2
8) PARIS OH-3 50 S.C.U.	Alum. Vert. Slider	- Nil	3
9) WELLAND OH-12 29 S.C.U.	Alum. Horiz. Slider	- Nil	2
10) NIAGARA FALLS OH-14 200 S.C.U.	Alum. Horiz. Slider	- Binding Windows (Roller Bearings changed to glides) - Safety latches located too high for Seniors' to operate.	6

F.H.U. Family Housing Unit
S.C.U. Senior Citizen Unit

APPENDIX "C"

SUMMARY OF 1983 WINDOW REPLACEMENT AND RECAULKING PROJECTS

LOCALITY: METRO TORONTO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	BUDGET REQUIRED	AGE OF BLDG.
1) KINGSTON ROAD OH-21 91 F.H.U.	Aluminum Horizontal Slider	- Dry rot of window frame - Deterioration of interior walls - Air infiltration and water penetration	$75,000	18
2)* O'CONNOR DRIVE OH-1 236 F.H.C.	Aluminum Horizontal Sliders	- Water penetration due to caulking failure on south-west elevation of building	$10,000	16
3) DON SUMMERVILLE OH-91 120 F.H.U.	Steel single glazed Roto handle	- Condensation (Frost build-up on interior pane) - Many windows inoperable - Deterioration of reveals	$66,000	20
4) EASTVIEW PARK OH-93 41 F.H.U.	Sashless Wood	- Dry rot of wood frame - Air infiltration and water penetration	$17,000	27
5) SCATTERED UNITS OH-22 100 F.H.U.	Inside wooden sliders with outside aluminum storms	- Drafty windows with high levels of air infiltration and some water penetration	$20,000	30
6) PELHAM PARK OH-46 455 F.H.U.	Aluminum single glazed	- Condensation - Drafty (high heat losses) - Deterioration of interior walls	$98,000	15
7) SHARMEN MEWS OH-129 154 F.H.U.	Sashless Wood	- Dry rot of wood frame - Air infiltration and water penetration - Drafty	$95,000	9
8) LAWRENCE HEIGHTS FP5/54 229 F.H.U.	Sashless Wood	- Dry rot of wood frame - Air infiltration and water penetration - Drafty	$25,000	22
9) SHEPPARD YATES CASTLE OH-12 148 F.H.U.	Sashless Wood	- Dry rot of wood frame causing air infiltration and water penetration	$125,000	20
10) TORWOODS VILLAGE OH-44 306 F.H.U.	Sashless Wood	- Window condensation - Water and air penetration - Drafty windows	$90,000	16

* Projects where existing windows have to be re-caulked.

SUMMARY OF 1983 O.H.C. WINDOW REPLACEMENT AND RECAULKING PROJECTS

LOCALITY: METRO TORONTO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	BUDGET ESTIMATE	AGE OF BLDG.
11) KIPLING MT. OLIVE OH-45 158 F.H.U.	Wood Vinyl (Sashed)	- Extrusion parts no longer available for window repair - Air infiltration and water penetration	$50,000	15
12) THISTLETOWN II OH-26 245 F.H.U.	Wood Vinyl (Sashed)	- Difficult to find replacement parts - Dry rot of wood frame - Air infiltration and water penetration	$100,000	15
13) WEST MALL OH-62 PHASED 99 F.H.U.	Sashless Wood	- Condensation - Air infiltration and water penetration - Dry rot	$50,000	21
14) WILLOWDALE OH-31 198 F.H.U.	Steel casement with aluminum storm	- Roto handles inoperable - Difficult to close window extensive - Air infiltration	$250,000	21
15) LESLIE/ WYMARK OH-140 122 F.H.U.	Semi-sashless Wood/vinyl	- Vinyl extrusions breaking - Hardware breaking down - High levels of heat loss - Air and water penetration	$214,000	10
16) HALLBANK/ PITFIELD OH-134 38 F.H.U.	Sashless Wood	- Dry rot of wood frames causing air infiltration and water penetration - Condensation	$40,000	9
17) * TANDRIDGE CRESCENT II OH-54 221 F.H.U.	Aluminum Horiz. Sliders	- Water penetration and air infiltration due to caulking failure	$10,000	16
18) SCARLETT WOOD FP 6/58 150 F.H.U.	Semi-sashless Aluminum	- Poorly fitting (high energy losses) - Replacement alum. extrusions are no longer available - Water and air penetration	$30,000	21
19) * BLEECKER I OH-66 955 F.H.U.	Aluminum Horiz. Sliders	- Water penetration - Recaulking of three (3) buildings	$25,500	14
20) * BLEECKER II OH-74 719 F.H.U.	Aluminum Horiz. Sliders	- Water penetration - Recaulking of exterior of building	$8,500	14

* Projects where existing windows have to be recaulked.

SUMMARY OF 1982 O.H.C. WINDOW REPLACEMENT AND RECAULKING PROJECTS

LOCALITY: METRO TORONTO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	BUDGET ESTIMATE	AGE OF BLDG.
1) * ST. CLAIR BIRCHMOUNT I OH-69 98 F.H.U.	Aluminum Horiz. Sliders	- High levels of air infiltration - Unbalanced heating system - Windows to be re-caulked	$23,400	15
2) * ST. CLAIR BIRCHMOUNT II OH-78 94 F.H.U.	Aluminum Horiz. Sliders	- Water penetration causing plaster deterioration around window reveals - Windows to be re-caulked	$45,000	13
3) 93 EDGEWOOD AVENUE OH-38 96 F.H.U.	Single Glazed Steel Casement	- Air infiltration - Condensation causing freeze up during winter - High Heat Loss - Deterioriation of reveals	$64,400	27
4) LAWRENCE DE MARCO OH-40 55 F.H.U.	Wood Single Glazed	- Water penetration, air infiltration - Condensation - Dry rot (2nd Floor only)	$20,000	28
5) LAWRENCE HEIGHTS FP 5/54 229 F.H.U.	Wood Sashless	- Dry rot - Air infiltration - Extensive repairs required - Water penetration	$95,000	22
6) THISTLETOWN I FP10/63 309 F.H.U.	Wood Sashless	- Rotting of wood frame - Water penetration and air infiltration	$20,000	16
7) THISTLETOWN II OH-26 245 F.H.U.	Semi-sashless Vinyl - Wood	- Vinyl extrusions no longer available - High air infiltration - Extensive repair needed	$50,000	15
8) ISLINGTON SATTERLY OH-131 32 F.H.U.	Semi-sashless Vinyl/Wood	- Vinyl extrusions are breaking down and are no longer available - Water and air penetration	$30,000	8
9) * JANE/HILO OH-104 171 F.H.U.	Aluminum Horiz. Sliders	- Water penetration on north-east walls top floor only - Windows require re-caulking	$7,000	12
10) EDGELEY VILLAGE OH-25 579 F.H.U.	Semi-sashless Wood/Vinyl	- Rotting wood frame - Air infiltration and water penetration	$160,000	14

* Projects where existing windows have to be re-caulked.

SUMMARY OF 1982 O.H.C. WINDOW REPLACEMENT AND RECAULKING PROJECTS

LOCALITY: METRO TORONTO

PROJECTS	EXISTING WINDOW TYPE	DESCRIPTION OF WINDOW DETERIORATION	BUDGET ESTIMATE	AGE OF BLDG.
11) ALBION/ SHENDALE OH-47 34 F.H.U.	Semi-sashless Wood/Vinyl	- Rotting of wood frame causing air and water penetration	$30,000	21
12) WEST MALL OH-62 99 F.H.U.	Sashless Wood	- Extensive deterioration - Condensation - Air and water penetration - Dry rot	$30,000	21
13) EAST MALL OH-14 104 F.H.U.	Sashless Wood	- Condensation - Air and water penetration - Dry rot	$43,000	21
14) PARKWOODS RAYOAH OH-5 147 F.H.U.	Steel Casements	- Difficulty in opening and closing - High air infiltration	$200,000	21
15)* FINCH/ BRAHMS OH-105 356 F.H.U.	Aluminum Horiz. Sliders	- Water penetration - Caulking all windows on north and south and west elevations	$38,000	11
16) HALLBANK/ PITFIELD OH-134 38 F.H.U.	Sashless Wood	- Warped rotten wood frames - Seized and inoperable windows - air infiltration and high heat losses	$33,000	9
17) ROYWOOD DRIVE OH-39 84 F.H.U.	Sashless Wood	- Dry rot of wood frames - Several windows inoperable - Air infiltration	$170,000	21

* Projects where existing windows have to be re-caulked.

APPENDIX "D"

WINDOW ASSESSMENT SURVEY

PROJECT

Project Number : ____-_____ Project Name : _____

Address : _____ Region : _____

I. **BUILDING IDENTIFICATION**

Type of building : a) Apartment Building

i) High Rise ☐ ii) Low Rise ☐

b) Occupancy

i) Family ☐ ii) Senior Citizen ☐

c) Housing

i) Detached ☐ ii) Semi-detached ☐

iii) Townhouse ☐

Age of build'ng : _____ years

Total number of stories : _____ floors

II. **WINDOW DESCRIPTION**

Window Category : Aluminum ☐ Steel ☐

Non thermally broken ☐

Thermally broken ☐

Not distinguishable ☐

Wood ☐ Vinyl ☐ Vinyl-wood ☐ Vinyl-aluminum ☐

Wood-steel ☐

Sashless ☐ Semi-sashless ☐ Sash ☐

Other (Specify) _____

Window Types

1. Slider a) Horizontal
   b) Vertical
2. Casement a) Inward Projected
   b) Outward Projected
3. Awning a) Inward Projected
   b) Outward Projected
4. Hopper a) Inward Projected
   b) Outward Projected
5. Fixed a) Thermopane
   b) Storm Window

III. GENERAL CONFIGURATION OF ON-SITE WINDOWS

STANDARD WINDOW

Location : bedroom ☐ livingroom ☐ kitchen ☐ corridor ☐
diningroom ☐ bathroom ☐ lobby ☐ common room ☐
other _____

Window type : _____

Glazing : single ☐ double ☐ insulated ☐

Glazing thickness : _____ mm

Overall size : _____ mm wide by _____ mm high

Hardware : wood ☐ stainless steel ☐ plastic ☐
steel ☐ aluminum ☐
other _____

Screen : mesh - aluminum ☐ steel ☐ fiberglass ☐
frame - extruded aluminum ☐ steel ☐
roll-formed aluminum ☐

Finish : paint ☐ anodized ☐ mill ☐ vinyl cladding ☐

Weatherstrip : woven pile ☐ finseal ☐ gasket ☐
plastic fin ☐ none ☐

Identification marks : (on frame, sash or sealed units)

if yes note _____

III. GENERAL CONFIGURATION OF ON-SITE WINDOWS

COMPOSITE WINDOW

Location : bedroom ☐ livingroom ☐ kitchen ☐ corridor ☐
diningroom ☐ bathroom ☐ lobby ☐ common room ☐
other _____

Approximate overall size : _____ mm wide by _____ mm high

Fixed Window : position _____

Glazing : single ☐ double ☐ insulated ☐
interior storm window ☐ exterior storm window ☐

Glazing thickness _____ mm

Operating Window : type _____ position _____

Glazing : single ☐ double ☐ insulated ☐
interior storm window ☐ exterior storm window ☐

Glazing thickness _____ mm

Weatherstrip : woven pile ☐ finseal ☐ gasket ☐
plastic fin ☐ none ☐

Hardware : wood ☐ stainless steel ☐ plastic ☐ steel ☐
aluminum ☐ other _____

Screen : mesh - aluminum ☐ steel ☐ fiberglass ☐
frame - extruded aluminum ☐ roll-formed aluminum ☐
steel ☐

Finish : paint ☐ anodized ☐ mill ☐ vinyl cladding ☐

Identification marks : (on frame, sash or sealed units)

if yes note _____

III. GENERAL CONFIGURATION OF ON-SITE WINDOWS

RETROFIT WINDOW

Location : bedroom ☐ livingroom ☐ kitchen ☐ corridor ☐
diningroom ☐ bathroom ☐ lobby ☐ common room ☐
other _____

Approximate overall size : _____ mm wide by _____ mm high

Fixed Window : position _____

Glazing : single ☐ double ☐ insulated ☐
interior storm window ☐ exterior storm window ☐

Glazing thickness _____ mm

Operating Window : type _____ position _____

Glazing : single ☐ double ☐ insulated ☐
interior storm window ☐ exterior storm window ☐

Glazing thickness _____ mm

Weatherstrip : woven pile ☐ finseal ☐ gasket ☐
plastic fin ☐ none ☐

Hardware : wood ☐ stainless steel ☐ plastic ☐ steel ☐
aluminum ☐ other _____

Screen : mesh - aluminum ☐ steel ☐ fiberglass ☐
frame - extruded aluminum ☐ roll-formed aluminum ☐
steel ☐

Finish : paint ☐ anodized ☐ mill ☐ vinyl cladding ☐

Identification marks : (on frame, sash or sealed units)

if yes note _____

IV. VISUAL INSPECTION

	Window Sample #1	Window Sample #2	Window Sample #3
Unit Number :	_____	_____	_____
Window location (i.e. livingroom, bedroom, etc.)	_____	_____	_____
Window type	_____	_____	_____
Unit Orientation (North, South, East, West)	_____	_____	_____

A. GENERAL CONDITION

1. Visible deterioration present at (i.e. corroded, worn, bent, missing, dented)

Frame	sill track	☐	☐	☐
	corners	☐	☐	☐
	jambs	☐	☐	☐
	head	☐	☐	☐
	other location	☐	☐	☐
	specify	_____	_____	_____
Sash	rails (horizontal)	☐	☐	☐
	corners	☐	☐	☐
	stiles (verticals)	☐	☐	☐
	other location	☐	☐	☐
	specify	_____	_____	_____

IV. VISUAL INSPECTION

2. Signs of water penetration (i.e. water marks, rot, etc.)

above window	☐	☐	☐
beside jamb	☐	☐	☐
below window	☐	☐	☐
at floor level	☐	☐	☐
none	☐	☐	☐

3. Weep hole condition satisfactory (i.e. plugged)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

4. All sash are present

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

5. Window installed square

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

6. Sealant visible in frame corners (esp. lower)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

7. Are Mullions sealed

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

8. Are sash tight fitting (i.e. not loose)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

9. Appearance of hardware is satisfactory (i.e. not corroded, broken, missing, etc.)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

10. Can all the sash be removed

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

11. Glazing not broken

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

IV. VISUAL INSPECTION

12. Condition of screen satisfactory (i.e. not missing, torn, or bent)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

13. Screen can be removed and restalled from the interior

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

14. Fit of screen is satisfactory, (i.e. not short, narrow, large)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

B. OPERATIONAL CHECK

15. Will the operating window

a) open easily yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

b) remain open yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) close easily yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) close properly yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

e) lock securely yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

16. Is window securely fastened to opening when pushed

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

17. Glides or rollers satisfactory (i.e. not missing, or flat spotted, etc.)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

C. GLAZING

18. Can broken glazing be easily replaced

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

IV. VISUAL INSPECTION

19. All glazing spline present

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

20. Insulated unit is satisfactory (i.e. no condensation between panes or corrosion of spacer, etc.)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

21. Glazing tape condition satisfactory (i.e. no gaps, not hardened, not pushed out, etc.)

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

if no specify _____ _____ _____

D. WEATHERSTRIP

22. The weatherstrip is not engaged and sealing at

a) head rail yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

b) jamb stiles yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) sill rail yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) interlock yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

23. The weatherstrip is not worn or deteriorated at

a) head rails yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

b) jamb stiles yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) sill rails yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) interlock yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

24. The weatherstrip is not missing at

a) head rail yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

b) sill rail yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) jamb stiles yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) interlock yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

IV. VISUAL INSPECTION

E. AUTOMATIC ENGAGING WINDOW SAFETY DEVICE (100 mm limiter)

25. Two are present per operating window

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

26. Both are lower than 1950 mm from floor level

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

27. They are easily operated by an adult, but not a child

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

28. They can be reached without the use of a chair, etc.

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

29. They limit the opening of the interior sash to 100 mm

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

30. If both at the bottom, they are no more than 1350 mm apart

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

31. Location

a) on interior sash yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

b) on interior rack yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) on exterior sash yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) on exterior track yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

e) on meeting rail yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

F. SEALANT

32. Perimeter sealant was

a) hard	☐	☐	☐
b) missing	☐	☐	☐
c) seriously cracked	☐	☐	☐
d) minor cracks	☐	☐	☐
e) holes	☐	☐	☐
f) not adhering	☐	☐	☐
g) other	☐	☐	☐
specify	_____	_____	_____

33. Masonary surrounding window deteriorating to condition which could allow water or air to bypass around perimeter sealant.

a) spalling	☐	☐	☐
b) loose mortar	☐	☐	☐
c) cracked mortar	☐	☐	☐
d) cracked bricks	☐	☐	☐
e) other	☐	☐	☐

34. Condition of other exterior finishes (i.e. siding, wood, etc.) is satisfactory (i.e. no gaps are present)

	yes ☐ no ☐	yes ☐ no ☐	yes ☐ no ☐
if no specify	_____	_____	_____

C. OPTIONAL DISASSEMBLY INSPECTION

35. Remove glazing stops

a) material of setting blocks

rubber	☐	☐	☐
vinyl	☐	☐	☐
wood	☐	☐	☐
metal	☐	☐	☐
other	_____	_____	_____

b) location of the setting blocks at 1/4 points

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

c) interior side of fixed unit corners have open joints

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

d) there is no evidence of water build up behind the stops

yes ☐ no ☐ yes ☐ no ☐ yes ☐ no ☐

V. ON SITE WINDOW TESTS

Location

Unit number : _____

Window location : _____

Window type : _____

Unit orientation (north, south, east, west) : _____

Floor : _____

Suspected Air Leakage

1. Is air movement present? yes ☐ no ☐

if yes then use a smoke pencil (air current tube) to determine location of leakage

wind condition : strong ☐ light ☐ nil ☐

location of air infiltration :	none	small	some	large
corners	☐	☐	☐	☐
sill rail	☐	☐	☐	☐
jamb stiles	☐	☐	☐	☐
interlock	☐	☐	☐	☐
head rail	☐	☐	☐	☐
perimeter of window frame	☐	☐	☐	☐

other _____

_____

Optional Suspected Water Leakage Test

1. Tape drainage holes and fill exterior sill tracks with water

   a) Does water disappear from the track? yes ☐ no ☐

      if yes than :

      i) Does it appear to be draining out the drain holes?

      yes ☐ no ☐

      ii) Does it appear to be draining into the wall cavity?

      yes ☐ no ☐

      iii) Does it appear on the floor directly below window?

      yes ☐ no ☐

   b) Remove Tape

      i) Do the drainage holes function

      yes ☐ no ☐

      ii) Are the tracks slanted towards the

      side ☐ interior ☐

2. Perimeter Seal

   Spray water from bottle onto perimeter sealant

   a) Does water disappear into joint yes ☐ no ☐

   b) Does water appear on interior yes ☐ no ☐

   Location : _____

3. Other Areas

   Spray water from bottle onto window joints (i.e. connecting mullions)

   a) Does water disappear into joint yes ☐ no ☐

   b) Does water appear on interior yes ☐ no ☐

   Location : _____

4. Spray exterior location with fine spray from hose starting from the bottom

   a) Does water appear on the interior yes ☐ no ☐

   Location : _____

   b) Do the tracks overflow yes ☐ no ☐

APPENDIX "E"

WINDOW ASSESSMENT SURVEY

(SHORT FORM)

PROJECT

Project Number : _____ Project Name : _____

Address : _____ Region : _____

I. BUILDING IDENTIFICATION

Type of Building : a) Apartment Building

i) High Rise ( ) ii) Low Rise ( )

b) Occupancy

i) Family ( ) ii) Senior Citizen ( )

c) Housing

i) Detached ( ) ii) Semi-detached ( )

iii) Townhouse ( )

Age of Building : _____ years

Total number of stories : _____ floors

II. WINDOW DESCRIPTION

Window Category : Aluminum ( ) Steel ( )

Wood ( ) Vinyl ( ) Vinyl-wood ( ) Vinyl-aluminum ( )
Wood-steel ( )

Sashless ( ) Semi-sashless ( ) Sash ( )

Other (Specify) _____

Window Types:

1.	Slider	a) horizontal b) vertical
2.	Casement	a) Inward Projected b) Outward Projected
3.	Awning	a) Inward Projected b) Outward Projected
4.	Hopper	a) Inward Projected b) Outward Projected
5.	Fixed	a) Thermo Pane b) Storm Window

III. GENERAL CONFIGURATION OF ON-SITE WINDOWS

A. Window Type:_____ Location: _____
Glazing Type: _____ Thickness:_____
Dimensions: _____ mm wide by _____ mm high
Weatherstrip: _____ Hardware: _____
Screen: _____ Frame: _____
Finish: _____ Ident. Marks: _____

B. Window Type: _____ Location: _____
Glazing Type: _____ Thickness:_____
Dimensions: _____ mm wide by _____ mm high
Weatherstrip: _____ Hardware: _____
Screen: _____ Frame: _____
Finish: _____ Ident. Marks:_____

C. Composite Window
Window Types: _____ and _____ Location:_____ and_____
Glazing Types:_____ and _____ Thickness: _____ and_____
Overall Dimensions: _____ mm wide by _____ mm high
Weatherstrip:_____ Hardware: _____
Screen: _____ Frame: _____
Finish: _____ Ident. Marks:_____

D. Composite Window
Window Types:_____ and_____ Location:_____ and_____
Glazing Types:_____and_____ Thickness:_____ and_____
Overall Dimensions:_____ mm wide by _____ mm high
Weatherstrip: _____ Hardware:_____
Screen: _____ Frame: _____
Finish: _____ Ident. Marks:_____

IV. VISUAL INSPECTION

	Window Sample #1	Window Sample #2	Window Sample #3
Unit number :	_____	_____	_____
Window location : (i.e. livingroom, bedroom, etc.)	_____	_____	_____
Window type :	_____	_____	_____
Unit orientation : (North, South, East, West)	_____	_____	_____

A. GENERAL CONDITION

1. Visible deterioration present at (i.e. corroded, worn, bent, missing, dented)

Frame			
sill track	( )	( )	( )
corners	( )	( )	( )
jambs	( )	( )	( )
head	( )	( )	( )
other location	( )	( )	( )
specify	_____	_____	_____
Sash			
rails (horizontals)	( )	( )	( )
corners	( )	( )	( )
stiles (verticals)	( )	( )	( )
other location	( )	( )	( )
specify	_____	_____	_____

2. Signs of water penetration (i.e. water marks, rot, etc.)

above window	( )	( )	( )
beside jamb	( )	( )	( )
below window	( )	( )	( )
at floor level	( )	( )	( )
none	( )	( )	( )

3. Weep hole condition satisfactory (i.e. plugged)

	yes ( ) no ( )	yes ( ) no ( )	yes( ) no( )
if no specify	_____	_____	_____

4. All sash are present

	yes ( ) no ( )	yes ( ) no ( )	yes( ) no( )

5. Window installed square
yes( ) no( ) yes( ) no( ) yes( ) no( )

6. Sealant visible in frame corners (esp. lower)
yes( ) no( ) yes( ) no( ) yes( ) no( )

7. Are mullions sealed
yes( ) no( ) yes( ) no( ) yes( ) no( )

8. Are sash tight fitting (i.e. not loose)
yes( ) no( ) yes( ) no( ) yes( ) no( )

if no specify ---------- ---------- ----------

9. Appearance of hardware is satisfactory (i.e. not corroded, broken,
yes( ) no( ) yes( ) no( ) yes( ) no( )

if no specify ---------- ---------- ----------

10. Can all the sash be removed
yes( ) no( ) yes( ) no( ) yes( ) no( )

B. OPERATIONAL CHECK

11. Will the operating window
a) open easily yes( ) no( ) yes( ) no( ) yes( ) no( )
b) remain open yes( ) no( ) yes( ) no( ) yes( ) no( )
c) close easily yes( ) no( ) yes( ) no( ) yes( ) no( )
d) close properly yes( ) no( ) yes( ) no( ) yes( ) no( )
e) lock securely yes( ) no( ) yes( ) no( ) yes( ) no( )

12. Is window securely fastened to opening when pushed
yes( ) no( ) yes( ) no( ) yes( ) no( )

13. Glides or rollers satisfactory (i.e. not missing, or flat spotted, etc)
yes( ) no( ) yes( ) no( ) yes( ) no( )

if no specify ---------- ---------- ----------

C. WEATHERSTRIP

14. The weatherstrip is in satisfactory condition and sealing
a) head rail yes( ) no( ) yes( ) no( ) yes( ) no( )
b) jamb stiles yes( ) no( ) yes( ) no( ) yes( ) no( )
c) sill rail yes( ) no( ) yes( ) no( ) yes( ) no( )
d) interlock yes( ) no( ) yes( ) no( ) yes( ) no( )

D. AUTOMATIC ENGAGING SAFETY DEVICES (100 mm LIMITERS)

15. The number per operating window

specify _____ _____ _____

16. Location _____ _____ _____

17. The devices are operating satisfactorily

yes( ) no( ) yes( ) no( ) yes( ) no( )

if no specify _____ _____ _____

E. SEALANT CONDITION

18. Perimeter sealant was (i.e. hard, missing, seriously cracked, minor cracks, etc.)

specify _____ _____ _____

F. EXTERIOR ENVELOPE CONDITION

19. Masonry surrounding window was (i.e. spalling, loose mortar, cracked mortar, cracked bricks, etc.)

specify _____ _____ _____

20. Condition of other exterior finishes (i.e. siding, wood etc.) is satisfactory (i.e. no gaps are present)

yes( ) no( ) yes( ) no( ) yes( ) no( )

if no specify _____ _____ _____

APPENDIX "F"

WINDOW SHOP DRAWING CHECKLIST

Submitted by: _____ Date: _____

SHOP DRAWINGS:

Windows Manufactured by: _____

Model Number: _____

Frame Depth: _____

C.G.S.B. Specification No: _____

Are Test Reports available? Yes ( ) No ( )

Do the Windows have a warranty? Yes ( ) No ( )

_____ years

WINDOW CATEGORY:

Aluminum ( ) Steel ( )

Thermally broken: Yes ( ) No ( )

Wood ( ) Vinyl ( ) Vinyl-wood ( ) Vinyl-aluminum ( )
Wood-steel ( )

Sashless ( ) Semi-sashless ( ) Sash ( )

WINDOW TYPE: (i.e. Horiz. Slider) _____

GLAZING: Single ( ) Double ( ) Insulated ( )

MATERIAL:

SCREENS: Mesh-aluminum ( ) Steel ( ) Fiberglass ( )

FRAME: Extruded aluminum ( ) Steel ( ) Roll-formed aluminum ( )

WEATHERSTRIPPING: Woven Pile ( ) Fin Seal ( ) Gasket ( )
Plastic Fin ( ) None ( )

Was a sample Window submitted for approval? Yes ( ) No ( )

IDENTIFICATION MARKS: (on frame, sash or sealed units)

If Yes note _____

HARDWARE: Wood ( ) Stainless Steel ( ) Plastic ( )
Steel ( ) Aluminum ( ) Other ( )

FINISH: Paint ( ) Anodized ( ) Mill ( )
Vinyl cladding ( )

FINISH: .0004 Anodized ( ) .0007 Hardcolour ( )

DESCRIPTION: DURACRON ( )

SAFETY LATCHING DEVICES: Are automatic safety latching devices specified?
Yes ( ) No ( )

If yes specify _____

PERFORMANCE:

C.G.S.B. Standards:

- Are they current? - (After June 1979) Yes ( ) No ( )
- If combined window fixed and operable were test reports submitted for both components? Yes ( ) No ( )

  (C.G.S.B. - 63-GP-2M - horizontal or vertical)
  (C.G.S.B. - 63-GP-8M - projected)
  (C.G.S.B. -63-GP-12M - fixed)

- Were test reports complete? Yes ( ) No ( )

  Specify non-compliance items: _____

  _____

- Were test reports submitted for acoustical performance? Yes ( ) No ( )